BULLETIN

(*formerly* JOURNAL)

OF THE

AMERICAN GEOGRAPHICAL SOCIETY

OF

NEW YORK

MDCCCCV

VOL. XXXVII

NEW YORK
PUBLISHED BY THE SOCIETY

AMERICAN GEOGRAPHICAL SOCIETY.

OFFICERS AND COUNCILLORS,

1905.

OFFICERS.

PRESIDENT

COMMANDER ROBERT E. PEARY, C.E., U.S.N.

Term expires 1906

VICE-PRESIDENTS

W. H. H. MOORE
Term expires 1906

D. O. MILLS
Term expires 1907

C. C. TIFFANY, D.D.
Term expires 1908

FOREIGN CORRESPONDING SECRETARY

PROF. WILLIAM LIBBEY
Term expires 1906

DOMESTIC CORRESPONDING SECRETARY

CHANDLER ROBBINS
Term expires 1908

RECORDING SECRETARY

ANTON A. RAVEN
Term expires 1907

TREASURER

WALTER R. T. JONES
Term expires 1906

COUNCILLORS

FRANCIS M. BACON
JOHN GREENOUGH
JAMES J. HIGGINSON
S. NICHOLSON KANE
M. TAYLOR PYNE
Terms expire 1906

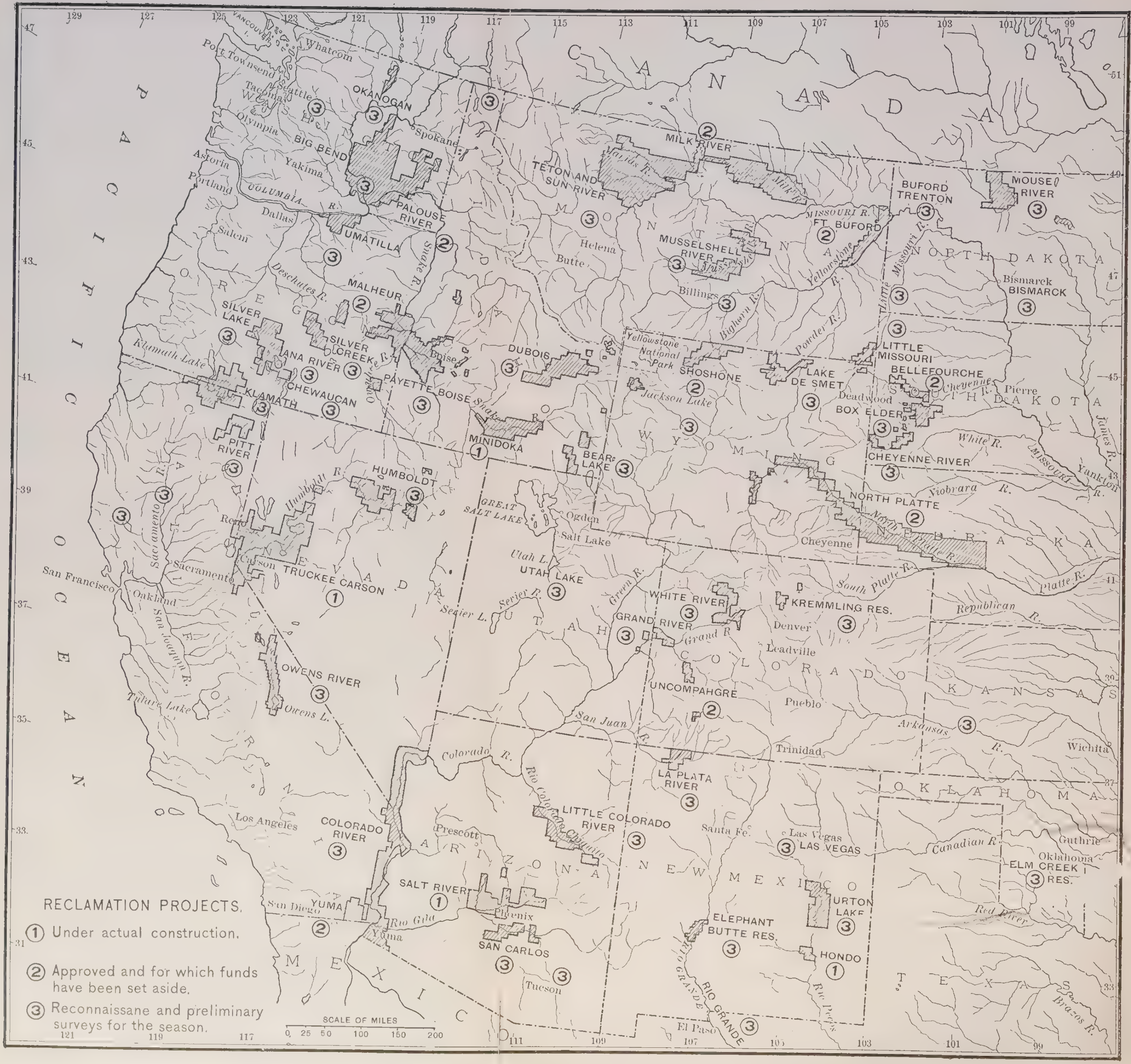
LEVI HOLBROOK
ARCHER M. HUNTINGTON
MORRIS K. JESUP
GUSTAV E. KISSEL
HENRY PARISH
Terms expire 1907

GEORGE S. BOWDOIN
CHARLES S. FAIRCHILD
HENRY HOLT
ARCHIBALD D. RUSSELL
HERMAN C. VON POST
Terms expire 1908

CONTENTS.

	PAGE
Lists of Officers and Councillors	v
Charter of Incorporation	357
Amended Charter	359
By-Laws	362
Honorary and Corresponding Members and Fellows	368
The U. S. Reclamation Service (map and plate). By C. J. BLANCHARD	1
Van der Grinten's Circular Projection (2 plates). By G. W. LITTLEHALES	14
The Floor of the North Atlantic Ocean	18
Marine Fossils near the Southern Edge of the Sahara	21
Semi-Centennial of the American Geographical Society	22
The Investigation of Alaska's Mineral Wealth (map). By ALFRED H. BROOKS	26
A Menace to the New York Harbour Entrance. By LEWIS M. HAUPT, C. E.	65
The Lakes Beside the Lower Tarim. By DR. SVEN HEDIN	78
The Opportunity for the Association of American Geographers. By W. M. DAVIS	84
Cirques: A Review. By ROBT. MARSHALL BROWN	86
A Résumé of the Geographical Distribution of the Discoglossoid Toads. By L. STEJNEGER	91
Second Antarctic Voyage of the "Scotia"	94
Address of President Peary, at the Annual Meeting of the American Geographical Society, Jan'y 24, 1905	129
Rubber in the Amazon Basin (with map)	143
Topography and Travel in Pennsylvania. By W. S. TOWER	145
The Biological Evidence of River Capture. By DOUGLAS WILSON JOHNSON	154
The Gorges and Waterfalls of Central New York. By R. S. TARR	193
The Victoria Falls of the Zambezi (with map)	213
Earthquakes in Japan (with map)	216
Launching of the "Roosevelt" (with illustration)	220
The Philippine Census. By HENRY GANNETT	257
The Depression of Sistan in Eastern Persia (two maps). By ELLSWORTH HUNTINGTON	271
Terrestrial Magnetic Work of the U. S. Coast and Geodetic Survey. By G.W. LITTLEHALES	281
An Argentine Observatory and some Patagonian Lakes	284
The Great Roads across the Appalachians. By ALBERT PERRY BRIGHAM	321
Notes from the Diary of the late Francis H. Nichols in China (with map)	339
The Climatic Zones and their Subdivisions (with maps). By ROBERT DEC. WARD	385
The Island of Quelpart (map). By H. B. HULBERT	396
Expedition to Hudson Bay and Northward	408
The Useful Plants of Guam	411
The Yerba Mate	413
The Basin of Lake Titicaca (with map). By A. F. BANDELIER	449

	PAGE
The Economic Importance of the Plateaux in Tropic America. By J. RUSSELL SMITH	461
The Alaskan Range: A New Field for the Mountaineer. By ALFRED H. BROOKS	468
A Photograph of Mount Everest	480
Commander Peary's Start for the Arctic	481
Maps: their Handling, Classification and Cataloguing. By THOMAS LETTS.	485
Mountains and Kibitkas of Tian Shan. By ELLSWORTH HUNTINGTON	513
The Western Sierra Madre of the State of Chihuahua, Mexico. By E. O. HOVEY	531
Zum Kontinent des Eisigen Südens. A Review by E. S. BALCH	548
Geography of American Cities. By W. S. TOWER	577
Photographing Wild Animals (with 4 illustrations)	588
Peary Arctic Club Expedition, Summer of 1905. By R. E. PEARY, U. S. N.	594
American Samoa. By FRANK TAYLOR CHAMBERS	641
Youth, Maturity and Old Age of Topographic Forms. By D. W. JOHNSON	648
XVth German Geographical Congress (Danzig, 1905). By AUGUST WOLKENHAUER	653
The Railway in Newfoundland. By C. M. SKINNER	658
South Polar Chart (p. 702)	686
From Tiflis to Tibet. By OSCAR T. CROSBY	703
Early Western Explorers and the Railroads. By HENRY GANNETT	716
Antarctic Nomenclature. By EDWIN SWIFT BALCH	718
Cultivated Rubber. By JOHN C. HORTER	720
The Partition of Sakhalin	724
Uniformity in Mountain Elevations. By ANGELO HEILPRIN	726
Map of the United States on a Scale of 1:1,000,000	730
Letter from Prof. W. Deecke	732
Obituaries	54, 64, 110, 172, 238, 298, 496, 497, 640, 688, 689, 690, 743
The Geographical Record	40, 97, 157, 222, 286, 416, 490, 551, 601, 665, 732
Maps, noticed	54, 110, 172, 239, 425, 497, 564, 616, 678, 743
Accessions to the Library	115, 243, 428, 622
Book Notices	58, 122, 177, 251, 304, 383, 436, 502, 568, 629, 692, 748
Transactions of the Society	40, 97, 157, 222, 286


RECLAMATION PROJECTS.
1 Under actual construction.
2 Approved and for which funds have been set aside.
3 Reconnaissane and preliminary surveys for the season.
SCALE OF MILES
0 25 50 100 150 200
PACIFIC OCEAN
CANADA
MEXICO
WASHINGTON
OREGON
CALIFORNIA
NEVADA
IDAHO
MONTANA
WYOMING
UTAH
COLORADO
ARIZONA
NEW MEXICO
NORTH DAKOTA
SOUTH DAKOTA
NEBRASKA
KANSAS
OKLAHOMA
TEXAS
OKANOGAN
BIG BEND
PALOUSE RIVER
UMATILLA
MALHEUR
SILVER LAKE
SILVER CREEK
CHEWAUCAN
KLAMATH
PITT RIVER
PAYETTE BOISE
MINIDOKA
DUBOIS
HUMBOLDT
TRUCKEE CARSON
OWENS RIVER
COLORADO RIVER
YUMA
SALT RIVER
SAN CARLOS
LITTLE COLORADO RIVER
MILK RIVER
TETON AND SUN RIVER
MUSSELSHELL RIVER
FT. BUFORD
BUFORD TRENTON
MOUSE RIVER
BISMARCK
LITTLE MISSOURI
BELLEFOURCHE
BOX ELDER
CHEYENNE RIVER
SHOSHONE
LAKE DE SMET
BEAR LAKE
NORTH PLATTE
UTAH LAKE
WHITE RIVER
GRAND RIVER
KREMMLING RES.
UNCOMPAHGRE
LA PLATA RIVER
LAS VEGAS
ELM CREEK RES.
URTON LAKE
ELEPHANT BUTTE RES.
HONDO
RIO GRANDE
Seattle
Tacoma
Olympia
Port Townsend
Whatcom
Spokane
Yakima
Astoria
Portland
Dallas
Salem
Helena
Butte
Billings
Bismarck
Pierre
Deadwood
Yankton
Yellowstone National Park
Jackson Lake
Ogden
Salt Lake
Great Salt Lake
Cheyenne
Denver
Leadville
Pueblo
Trinidad
Wichita
Guthrie
Oklahoma
Santa Fe
Las Vegas
El Paso
Prescott
Phenix
Tucson
Yuma
San Diego
Los Angeles
San Francisco
Oakland
Sacramento
Reno
Carson
Klamath Lake
Tulare Lake
Owens L.
Sevier L.
Utah L.
Columbia R.
Snake R.
Deschutes R.
Humboldt R.
Sacramento
San Joaquin R.
Missouri R.
Yellowstone R.
Bighorn R.
Powder R.
Milk R.
Cheyenne R.
White R.
Niobrara R.
North Platte R.
South Platte R.
Platte R.
Republican R.
Arkansas R.
Canadian R.
Red River
Brazos R.
James R.
Green R.
Grand R.
San Juan R.
Colorado R.
Rio Colorado Chiquito
Rio Gila
Rio Pecos
Sevier R.

BULLETIN

OF THE

AMERICAN GEOGRAPHICAL SOCIETY.

Vol. XXXVII 1905. No. 1

THE UNITED STATES RECLAMATION SERVICE.

BY

C. J. BLANCHARD.

The third field season of the U. S. Reclamation Service since its organization on June 17, 1902, is closed, except in the South-west, where climatic conditions do not prevent continuance of field work throughout the year.

A summary of the reports of the district engineers for the thirteen States and three Territories in the arid region furnishes most convincing evidence that the Reclamation Service has been organized on broad and thoroughly practical lines, which are calculated to insure the largest measure of results with the most economical expenditure of the reclamation fund.

Since the inception of the Service the general conduct of the work has been under the charge of Mr. Frederick H. Newell, as head of the Hydrographic Branch of the Geological Survey and Chief Engineer of the Reclamation Service. He has from time to time added to his advisory board consulting engineers and specialists of experience and ability, the general staff now including the following:

Arthur P. Davis, Assistant Chief Engineer; J. B. Lippincott, H. N. Savage, J. H. Quinton, and C. H. Fitch, supervising engineers; G. Y. Wisner, B. M. Hall, W. H. Sanders, A. J. Wiley, and C. S. Schlichter, consulting engineers; Morris Bien, engineer-in-charge of investigations of land titles; N. H. Darton, hydrographer-in-charge of the western section of hydrology; H. A. Storrs and O. H. Ensign, electrical engineers; G. A. Hammond, superintendent of borings; T. H. Means, engineer of soils; and others.

The proceeds from the sales of public lands in the thirteen

States and three Territories constitute what is known as the reclamation fund. The following table gives by States the total amount of funds received from the sale of public lands during the fiscal years 1901–04. For 1904 the figures are approximate only, but the totals are sufficiently exact for the purpose of estimates:

TABLE I.

State or Territory.	1901.	1902.	1903.	(Approximate) 1904.	Aggregate.
Arizona	$42,586.16	$39,187.35	$48,360.20	$36,270.15	$166,403.86
California	205,030.40	298,240.36	839,221.40	629,416.05	1,971,908.21
Colorado	254,889.88	374,105.13	549,812.89	412,359.66	1,591,167.56
Idaho	206,645.36	300,803.27	650,331.95	487,748.97	1,645,529.55
Kansas	20,188.78	28,946.94	27,836.50	20,877.36	97,849.58
Montana	367,342.31	405,035.49	558,071.49	418,553.61	1,749,002.90
Nebraska	102,963.24	132,234.94	138,728.70	104,046.54	477,973.42
Nevada	9,183.47	14,230.61	14,136.76	10,602.57	48,153.41
New Mexico	75,203.06	72,034.60	154,265.49	118,629.11	420,202.26
North Dakota	449,474.96	778,021.35	1,244,916.47	933,687.36	3,406,100.14
Oklahoma	370,464.93	638,330.44	864,766.83	678,575.13	2,552,137.33
Oregon	364,988.62	543.972.44	1,896,970.68	1,422,728.01	4,230,659.75
South Dakota	113,274.20	194,288.17	248,696.14	186,522.09	742,780.60
Utah	98,416.00	48,408.38	88,872.38	66,654.27	302,351.03
Washington	257,180.95	536,907.82	1,109,299.54	831,974.67	2,735,362.98
Wyoming	206,989.59	178,773.24	279,709.18	209,781.87	875,253.88
Total	$3,144,821.91	$4,585,520.53	$8,713,996.60	$6,568,497.42	$23,012,836.46

Examination of the above table shows that the largest contributions to the fund have been received from Oregon, North Dakota, Washington, Oklahoma, and California. In the Pacific Coast States along the Coast Range are the most valuable timber-lands on our continent, and from this source has come the principal revenue of the land offices in those States. North Dakota and Oklahoma, one almost wholly in the humid and the other partly in the semi-arid belt, have enjoyed a land boom, and thousands of settlers have taken up Government land.

The receipts from public land sales show a falling off in 1904, and it is probable that the fund reached its maximum in 1903, and in succeeding years will gradually diminish. This is to be expected, for the reason that the cultivable areas have largely passed to private ownership. Vast areas of timber-lands have been included in forest reserves, thus eliminating these as sources of future income. The unoccupied areas, for the most part, consist of rough mountain slopes, high bench lands, and valleys deficient in rainfall or running streams. Until expensive irrigation works are constructed these valleys will continue as part of the public domain.

Laying Out the Work of Reclamation.

In each of the arid States and Territories a district engineer has been placed in charge of the work of investigating irrigation possi-

bilities, directing the operations of numerous field parties, and preparing preliminary plans for submission to consulting boards appointed by the Chief Engineer. The following is a list of the district engineers:

L. C. Hill, Arizona; Homer Hamlin, California; A. L. Fellows, Colorado; D. W. Ross, Idaho; C. C. Babb, Montana; J. E. Field, Nebraska; L. H. Taylor, Nevada; F. E. Weymouth, North Dakota; W. M. Reed, New Mexico; G. H. Matthes, Oklahoma; J. T. Whistler, Oregon; R. F. Walter, South Dakota; G. L. Swendsen, Utah; T. A. Noble, Washington; and J. Ahern, Wyoming. Each of these engineers is made a member of the board of consulting engineers at all meetings held for the purpose of considering projects in his State.

When it is considered that the field covered by the district engineers and their assistants includes an area equal to two-fifths of the United States; that the regions investigated are generally far removed from settlements, embracing vast areas of sage brush, desert and rough mountain country, the progress of the bureau has been rapid. The results have been of such value that actual construction has been carried on for nearly a year on projects in Arizona and Nevada.

A better conception of the scope of the work may be had by examining the map herewith, which shows: 1st, the projects upon which work has been begun; 2nd, projects which have been approved by the Secretary of the Interior; 3rd, the locations of reconnaissance surveys during the year.

The following table shows by States and Territories the projects which have been approved by the Reclamation Service, and the amounts set aside from the reclamation fund for construction:

PRINCIPAL RECLAMATION PROJECTS.

Arizona	Salt River	$3,000,000
California	Yuma	3,000,000
Colorado	Gunnison	2,500,000
Idaho	Minidoka	2,600,000
Montana	Milk River	1,500,000
Nebraska (Wyo.)	Pathfinder	1,000,000
Nevada	Truckee	3,000,000
New Mexico	Hondo	275,000
North Dakota	Fort Buford	1,200,000
Bismarck	Pumping project	250,000
Buford-Trenton	" "	300,000
Forward		$18,625,000

	Brought forward.	$18,625,000
Oregon	Malheur	2,000,000
South Dakota.......	Belle Fourche	2,100,000
Utah	Utah Lake..........	1,000,000
Washington	Palouse	1,500,000
Wyoming..........	Cody	2,250,000
Total..............................		$27,475,000

WORKS UNDER CONSTRUCTION.

Actual construction was begun in April, 1904, on the Salt River project in Arizona. This is a work of extraordinary interest to the Service, by reason of the peculiar and difficult engineering features involved. Sixty miles above Phœnix, and immediately below the mouth of Tonto Creek, the Salt River flows through a deep and narrow rock-walled gorge. The engineers propose to lock these walls together with a dam 210 feet high, 180 feet wide on the bottom, and 700 feet long on top, constructed of masonry as firm and as enduring as the hills from which it will be hewn. This lofty dam will hold in check the flood and normal discharge of Salt River, creating a lake 25 miles or more in length, and conserving 1,200,000 acre-feet of water. The stored waters will be turned into the river channel, to be caught up again by canals in the vicinity of Phœnix and turned upon from 160,000 to 200,000 acres of land.

In the construction of the dam, which is to be one of the most remarkable structures of its kind in the country, more than 200,000 barrels of cement will be required. Owing to the inaccessible locality of the dam site, it was found that the cost of cement delivered at that point was prohibitive. Excellent materials for the manufacture of a high quality of cement were found in the vicinity, and authority was asked and granted for the erection of a mill above the site proposed for the dam. A contract has been awarded for the work to be completed by the first of January. It is expected that the contractors who are excavating the power canal will complete their work by the first of May, 1905.

At the dam site, and at other points along the river where favourable sites exist, power will be developed and utilized for pumping, power being transmitted to sub-stations, and from these distributed at a lower voltage to pumping stations in the valley. Special interest attaches to the power development of this project from the fact that it may be partly utilized for the reclamation of large areas belonging to the Pima, Papago, and Maricopa Indians, whose distress and suffering, by reason of the deficient

water supply on their reservation, have been made the subject of numerous appeals to Congress for relief. The Indian lands apparently are underlain by good water-bearing strata at moderate depths; and with cheap power, developed on the Salt and Gila Rivers, it is believed that several thousand acres can be reclaimed and rendered productive by the Indians. The estimated cost of the Roosevelt dam and power system is $3,200,000.

ROOSEVELT DAM SITE, SALT RIVER, ARIZONA.

The plans of the reclamation engineers in Nevada are so broad and comprehensive, involving the storage of the floods of the four principal rivers of that State, that the work has been subdivided. The attention of the Service was given first to the sub-project on the Truckee River, and contracts to construct the main canal from this stream were signed in August, 1903. The work is now practically complete. In August, 1904, contracts were signed for the main lateral systems for utilizing the waters of this canal; and on December 15 proposals were opened for constructing about 150 miles of distributing ditches, which will complete the irrigation system for about 50,000 acres of land. The Secretary of the Interior has set aside the sum of $3,000,000 for this project.

Projects Ready for Construction.

Colorado.—In Colorado the attention of the Service has been concentrated principally upon the Uncompahgre project, which contemplates the irrigation of lands in the Uncompahgre Valley, the waters being diverted from Gunnison River. The two drainages are divided by the Vernal Mesa, which has a general elevation of 8,000 feet. At the point of diversion the Gunnison is in a profound cañon more than a thousand feet below the mesa's summit. By a dam in the Gunnison River the waters of this stream will be diverted into a tunnel 6 miles long, excavated under the Vernal Mesa, and conveyed therein to canals in the Uncompahgre Valley. Contracts have been awarded on this project for the construction of a telephone system, the south canal, and the great Gunnison tunnel, and work is being actively pushed on the former. It is expected that the contractors will begin the tunnel in the very near future, and this work will require more than three years for its construction. The estimated cost of this project is $2,500,000, and the area reclaimed will be approximately 100,000 acres.

Idaho.—In September, 1904, contracts were awarded for the diversion dam and a portion of the main canal from Snake River, near Minidoka, Idaho. The contractors are making active preparations for pushing this work throughout the winter months. By this project it is proposed to reclaim from 130,000 to 150,000 acres of desert land belonging to the United States. The natural conditions are unusually favourable for the development of power, and it is proposed to establish pumping plants which will develop 17,500 horse-power during low stages of the river. This power will be utilized for the irrigation of 76,000 acres of land in the Minidoka tract which lies at too high an elevation to be supplied through a gravity system. The estimated cost of the Minidoka project is $2,600,000.

New Mexico.—The reclamation engineers have located a feasible project in New Mexico in the valley of the Hondo River, about 12 miles southwest from the town of Roswell. The reservoir site was found and surveyed, and authority was given by the Secretary of the Interior to proceed with the project. Contracts were let September 6th for the construction of six miles of canal, several earthen dams, together with headworks, outlet works, sluice gates, etc. It is estimated that this project will cost $250,000, and will supply water to 12,000 acres.

Nebraska and Wyoming.—Preliminary work this season has developed an attractive project on the North Platte River. This project involves some interesting inter-State features, as the lands to be irrigated are in Wyoming and Nebraska. As a result of the preliminary surveys an excellent reservoir site of large capacity has been located at the beginning of the cañon below the mouth of Sweetwater River. It is proposed to construct here a dam 75 feet in length at the bottom, 250 feet long on top, and 200 feet high. Surveys show that the capacity of the reservoir thus created will be 1,080,000 acre-feet, which it is believed is sufficient to contain all the flood and surplus waters of the North Platte at that point. The estimated cost of this dam is $1,000,000. To reach the irrigable lands the canal will have a length of 140 miles, making it the longest canal in any of the projects under consideration. The plans call for an expenditure of not less than $5,000,000 to complete the system. The acreage is not fully determined, but it is believed sufficient land can be included to bring the initial cost within $25 per acre. Proposals for the construction of the outlet tunnel have been invited, and bids will be opened in Washington January 9th.

North Dakota.—In North Dakota careful investigations were made of two proposed pumping projects, one at Bismarck and the other near Fort Buford. Both were decided to be feasible, and the Secretary of the Interior set aside $550,000 for construction. On the north side of the Missouri River a series of flats extends from the Montana–North Dakota line to about 4 miles east of Williston, North Dakota. Another series of similar flats is located near Bismarck, the combined area of irrigable lands approximating 38,000 acres. These flats are considerably higher than river, and pumping will be necessary to cover them with water. Lignite of fine quality, apparently inexhaustible in quantity, found near by, furnishes fuel at a maximum cost of $2 per ton. Completion of these projects depends upon the action of the owners of the land under them, who must pledge their property as security for the repayment to the Government of the cost of the irrigation works.

Oregon.—In Oregon the attention of the service has been given principally to the Malheur project in the southeastern part of the State. By this project it is proposed to supply water to 90,000 acres of bench and bottom lands in the valley of the Malheur and Owyhee Rivers. Reservoir sites of ample capacity have been located and mapped, and more than [illegible] miles of canal lines with topography have been completed. A water users' association, composed of

land owners in the district, has been organized to secure the co-operation of the Government in irrigating lands in private ownership. The detailed plans and estimates will be ready for bids as soon as all the land owners in the valley join this association. The cost of the Malheur project will approximate $2,600,000.

SOUTH DAKOTA.—Maps, plans, and estimates have been prepared of all structures in connection with the Belle Fourche project in South Dakota, and bids will be advertised for on February 1st, 1905. This project involves the reclamation of land to the northeast of the Black Hills in Butte and Meade counties, by the diversion of waters from the Belle Fourche and Redwater rivers into a natural reservoir six miles from the town of Belle Fourche. From the reservoir the water will be distributed to lands in the valley on both sides of the Belle Fourche River, the water supply being sufficient for the irrigation of approximately 100,000 acres of land. The estimated cost of the Belle Fourche project is $2,100,000, and three years will probably be required for its completion.

RECONNAISSANCE AND PRELIMINARY SURVEYS.

A large number of parties have been employed during the past year in all of the arid States and Territories on reconnaissance and preliminary surveys. Numerous petitions have been received from all parts of the arid regions, requesting that investigations be made of projects believed to exist in each locality, and much of the reconnaissance work has been undertaken in compliance with these requests. Only the most important of these surveys are noted here.

ARIZONA.—Hydrographers and hydrologists were engaged in several parts of Arizona during the season. Valuable and important data were secured concerning the underground water supply and the areas to which it can be applied to advantage. Part of this investigation was carried on in co-operation with the officials of the Indian Office, who are endeavouring to relieve the distressing conditions of several thousand Indians who have been brought almost to starvation on account of the water famine.

CALIFORNIA.—California, with its vast area and varied topography, has received the earnest consideration of several parties of reclamation engineers during the season. An important branch of the investigation, however, has been carried on in the drainage basin of the Colorado, where the engineering problems have been found most difficult of solution. Although the entire watershed of

this stream is in the United States, a small portion of its lower valley is in Mexico. While it receives no water from the latter country, the Colorado is classed among the international streams, and, under existing treaties, is considered as a navigable river. Diversion of the stream for irrigation is not permissible under existing law if navigation is affected thereby. Last winter Congress passed a law authorizing the Secretary to construct irrigation works to irrigate lands on both sides of the river above Yuma, Arizona. The plans of the engineers have been perfected, and it is estimated that 107,000 acres can be irrigated at a cost of $35 per acre. As outlined, the project includes an expensive system of levee and irrigation works, together with a diversion dam and long canals.

In California the field investigations in 1904 covered a wide range of territory. Considerable attention was given to the Sacramento Valley, the work here being carried on in co-operation with the State. The field is so large that another season will be required before it can be completed. In the eastern part of the State a study was made of both surface and underground waters in Owens Valley. On the northern boundary of the State the preliminary surveys indicated a feasible project in the basin of Klamath River, which includes irrigable lands in both California and Oregon. The project is an attractive one, as the water supply is ample for a large body of irrigable land in that locality. The engineering features are unique, inasmuch as it is proposed to reclaim a large body of marsh lands, at the same time using the drainage waters for irrigating areas farther down the river. Enormous undeveloped water-powers have been found on Klamath River, which may later be utilized for pumping water to higher levels than those which can be reached by gravity systems.

COLORADO.—The preliminary plans for a project in northwestern Colorado were completed this year, and are ready for the consideration of the consulting engineers. By this project it is proposed to divert the waters of White River for the irrigation of 90,000 acres of land in Routt and Rio Blanco counties. The estimated cost of this project is $2,000,000.

IDAHO.—In Idaho field parties have been engaged upon preliminary investigations of two projects, one in the southwestern part of the State, called the Payette-Boise, and the other in the eastern part, known as the Dubois project. The former, in the extent of the irrigated area and productivity of the soil, ranks among the

most important projects now being considered by the Service. The engineering features are comparatively simple, notwithstanding the plans contemplate using the waters of one stream in the valley of the other. The engineers propose to construct a diversion dam in the Payette River and, by means of a canal several miles in length and a short tunnel passing through the narrowest point in the divide which separates the two rivers, turn the waters into the Boise valley. The majority of the land owners in the valley have signified their approval of the enterprise. The acreage involved is nearly 300,000.

The Dubois project, located in the eastern part of the State, is one of considerable magnitude, embracing approximately 200,000 acres of Government land. The reconnaissance work on this project covered 1,570 miles, the surveys of canal lines aggregate 369 miles, and surveys of reservoirs 116 miles. Another season will be required to complete the preliminary work.

Montana.—Montana has proved a most inviting field for the prosecution of reclamation investigations during the past year, and prospects are encouraging for the development of several large projects which will make productive and valuable many thousand acres of land now arid and worthless. Attention in 1904 has been given chiefly to the Milk River project, in the northern part of the State. The progress of the work here has been considerably delayed by questions of an international character which have arisen, and which ultimately must be considered by the State Departments of both Governments. The project contains some unusual features, due to the fact that the Milk River, which rises in Montana, flows for many miles through Canadian territory before it turns southward to join the Missouri in Montana. At several points along its channel in Canada its waters are diverted for irrigation, and complications over prior water rights are certain to arise in the event that our Government should attempt to control the waters of this stream. The first plan considered by the engineers was to impound the waters of St. Marys River in the lakes of the same name in northern Montana and, by a canal, divert them into Milk River, which heads near the lakes. St. Marys River has a high mountain drainage, and is a constant stream; but, unfortunately, it flows north into Canada, and never comes back. To use the flood-waters of this stream to best advantage they must be permitted to run down Milk River for several hundred miles, partly in Canada, before they can be diverted

to irrigable lands in Montana. Unless satisfactory arrangements can be made with Canada for an equable division of the water, Montana irrigators will be at the mercy of the Canadian appropriators, who, of course, have first use of the water. For a portion of the summer the engineers have been working on plans to store the floods of Milk River in natural basins, and detailed estimates of the cost and of the irrigable area will soon be prepared for submission to the Chief Engineer.

While another year will be required to work out all the details of the Sun River project in this State, the preliminary surveys made this year indicate that a large project, embracing 300,000 acres, exists in this drainage basin, for which the water supply is ample.

By authority of Congress the Reclamation Service this spring made a preliminary reconnaissance and survey of the ceded lands in the Crow Indian reservation. The report of the engineers is favourable, and it is believed that the final surveys will develop a project which will reclaim 200,000 acres of fertile land in this section.

On the Yellowstone the surveys have developed a feasible project near Glendive, where a canal 70 miles in length will cover 60,000 acres in Montana and North Dakota. The estimated cost of this project is $1,800,000.

New Mexico.—Preliminary investigations in New Mexico this season covered a large portion of the territory and developed feasible projects on three streams. Of these the most important is undoubtedly that on the Rio Grande, known as the Engle project. Presenting as it does a satisfactory solution of the serious international controversy over water rights on this stream, which for a quarter of a century has been at fever heat in the lower valley, future history may decide that Peacemaker is a more appropriate name. The Engle project contemplates the storage of 2,000,000 acre-feet, or the entire normal and flood discharges of the Rio Grande, in a deep and narrow reservoir so large that 82 years of the silt-laden floods of this torrential and turbid stream will not destroy more than 60 per cent. of its efficiency. An area of 180,000 acres of land likened unto the famous Nile valley in fertility and productivity will receive an abundant and constant water supply, and a region which is now rapidly returning to its original state, that of a desert, through lack of water, will furnish homes for 90,000 happy and contented people. The entire cost of the reservoir, diversion dams, and canals is estimated at $7,200,000, or

$40 per acre. During the recent Irrigation Congress at El Paso the Chief Engineer of the Reclamation Service fully explained all the plans of the Engle Project, and the delegates from Mexico, Texas, and New Mexico voiced their approval without a single dissenting vote. The Engle project renders the international dam unnecessary. Its construction will settle for all time the deplorable and unhappy conditions which have so long existed in the valley. It will inaugurate an era of good feeling, of rapid and substantial development, in a section where irrigation is older than our written history.

The Urton project on Pecos River will divert the waters of this stream by means of a dam and a canal 35 miles long, the waters being stored in a large natural basin or reservoir provided with an outlet tunnel and distributing canals. The cost of the work will approximate $1,000,000, and the acreage supplied will be 60,000.

The Las Vegas project contemplates conducting water from Gallinas and Sapello Rivers to a point about five miles north of Las Vegas into a natural reservoir created by constructing a dam across a narrow arroyo. Investigations of the water supply will be continued through the year. A topographic map of the reservoir site and irrigable lands has been made.

Oklahoma.—Numerous investigations have been made in Oklahoma for irrigation possibilities, special attention being given to a study of water storage propositions in the country east of the Wichita Mountains and in Beaver County. Very careful investigation has also been made of the underground water resources. The work in this territory has not progressed to a point where a feasible project has yet been decided upon, and the surveys will be continued during 1905.

Utah.—Two projects have occupied the time and attention of the engineers in Utah during the season, one at Utah Lake and the other at Bear Lake. Both projects are full of complications owing to the heavy diversion of the waters of the streams entering into and flowing from these lakes, and at least another year will be required to complete the preliminary investigations.

Washington.—The principal reclamation project in Washington, known as the "Big Bend" project, is of such magnitude that the present state of the irrigation fund does not at this time warrant its inauguration. In its entirety the Big Bend project involves an expenditure in excess of the whole reclamation fund. Nearly 5,000,000 acres of fertile lands are included within its boundaries,

and the storage of the waters in numerous lakes and rivers is contemplated.

The work for the past season has been concentrated chiefly upon the Palouse project in the southeastern part of the State, preliminary surveys having shown its feasibility to the extent of irrigating at least 100,000 acres. Several parties have been engaged upon surveys of canal lines, irrigable lands, and reservoir and dam sites, and these data will be ready for consideration during the winter. The estimated cost of the system is $1,395,035.

Wyoming.—In Wyoming a rapid reconnaissance was made for a canal in that portion of the Wind River or Shoshone Indian reservation which is soon to be opened to settlement. The engineers' reports indicate that one or more feasible projects might be constructed there should Congress so order. The lands are exceedingly fertile, the water supply apparently ample, and the engineering features simple and inexpensive.

During a portion of the season work has been pushed vigorously on the Shoshone project, which contemplates the utilization of a portion of the surplus water of Shoshone River for the reclamation of land in the northern part of Big Horn County, Wyoming. A reservoir site has been found on this stream just below the junction of its North and South Forks, where it enters a deep cañon. The plan for a dam and headworks has been passed upon by a board of consulting engineers, and the sum of $2,250,000 was set aside by the Secretary of the Interior in February, 1904. The progress of the work has been delayed owing to unforeseen difficulties which were encountered in boring for bed rock at the dam site. Preliminary to the boring at the main dam work was begun on the wagon road into the cañon for the transportation of materials and telephone lines from the railroad to the dam site. The irrigable area to be covered by this project is approximately 103,000 acres.

Power and Pumping Investigations.

The electrical experts of the Service during the past season have made a study of power development and pumping features, the utilization of power in pumping water to higher levels being essential to the success of several of the projects. Some of these projects depend entirely upon pumping water for irrigation. On others it is proposed to utilize natural power sites wherever they can be found in the vicinity, and develop power to cover lands above the lines of gravity systems.

Similar studies have been made also in conjunction with the exceedingly important investigations of underground water resources of several important drainage basins, upon which a number of hydrologists have been employed in the West. Plans have been formulated for developing and utilizing power in construction work, thereby effecting a considerable saving in labour and time and in the first cost of permanent structures.

VAN DER GRINTEN'S CIRCULAR PROJECTION.

BY

G. W. LITTLEHALES.

Owing to the geometrical impossibility of developing a spherical or spheroidal surface in a plane, geographers have adopted various artifices, called projections, for representing, on a reduced scale and on a plane surface, the relative positions of points, lines, or objects on the earth's surface; and, since such positions are usually defined by spherical co-ordinates, the primary object of these artifices is the delineation of these circles of reference so that any point, line, or object intended for representation may be laid down according to its known co-ordinates. These so-called projections fall in three classes or subdivisions. The first comprises the true or perspective projections, like the orthographic and stereographic, in which the framework of parallels of latitude and meridians of longitude is represented as a spectator would see them on a plane surface placed in a definite relative position back of the globe upon and through which he is looking.

The second class is made up of those projections like the Mercator and the conic, in which the lines of spherical co-ordinates are first projected upon a circumscribing cylindrical or conical surface, which is afterwards conceived to be developed upon a plane surface by being cut open along an element of the cylinder or cone and then spread out flat.

The third class includes those projections which are neither formed by projection nor by development, but which are conventional constructions based upon geometrical laws, either assumed or fixed, and not representing the earth in such a way that it could be seen in that form by a spectator in any position whatsoever. Lambert's projection and Mollweide's or Babinet's homolographic

projection belong to this class, which has lately been extended by Mr. Alphons van der Grinten in a purely geometrical construction for the representation of the whole world within a circular bounding meridian by means of a network of parallels of latitude extending from pole to pole and of meridians of longitude extending throughout the circuit of the globe. The accompanying figure 1 will serve to indicate the method of construction. First describe a circle representing the marginal meridian inclosing an area equal to the surface of a sphere or globe of half the diameter of the circle, or, in other words, of twice the diameter of the given globe. Then draw the horizontal and vertical diameters of this circle to represent the equator and the middle meridian respectively. In the figure the equator is represented by the line AOA′, and the middle meridian by the line NOS. As the construction is identical in each of the four quadrants of the circle thus formed, it will be sufficient for the purpose of explanation if the construction is confined to two of the quadrants. Let the line OA′ be divided into a number of parts of the same length equal to half the total number of meridians to be shown on the globe, and the line ON into one-half as many equal parts as are shown along OA′; and let these points of subdivision be numbered as indicated in the figure. To draw a parallel of latitude representing, for example, the sixtieth-degree parallel of north latitude, from the point numbered 6 on the middle meridian ON draw the chord BC perpendicular to ON; and then draw the chord CA′, intersecting the line ON in the point D. The arc of the sixtieth-degree parallel will cross the central meridian ON at the point D. The chord AN is next drawn intersecting the chord BC in the point E, which is to be connected by a straight line with the point A′ for the purpose of locating the point F in which the line EA′ intersects the middle meridian. The chord which subtends the required parallel of sixty degrees of latitude crosses the middle meridian ON at the point F, so that FG drawn perpendicular to ON will represent half of that chord and a circular arc described from a centre J on the prolongation of the line ON and passing through the points G and D will be the required sixtieth-degree parallel of latitude. In a similar manner the remaining required parallels may be drawn.

The meridian lines are constructed by describing from centres, as M, on the line AA′ produced, a succession of arcs passing through the successive points of subdivision of the equator and the points N and S. One-half of one of such arcs is shown in the figure by the heavy line SR.

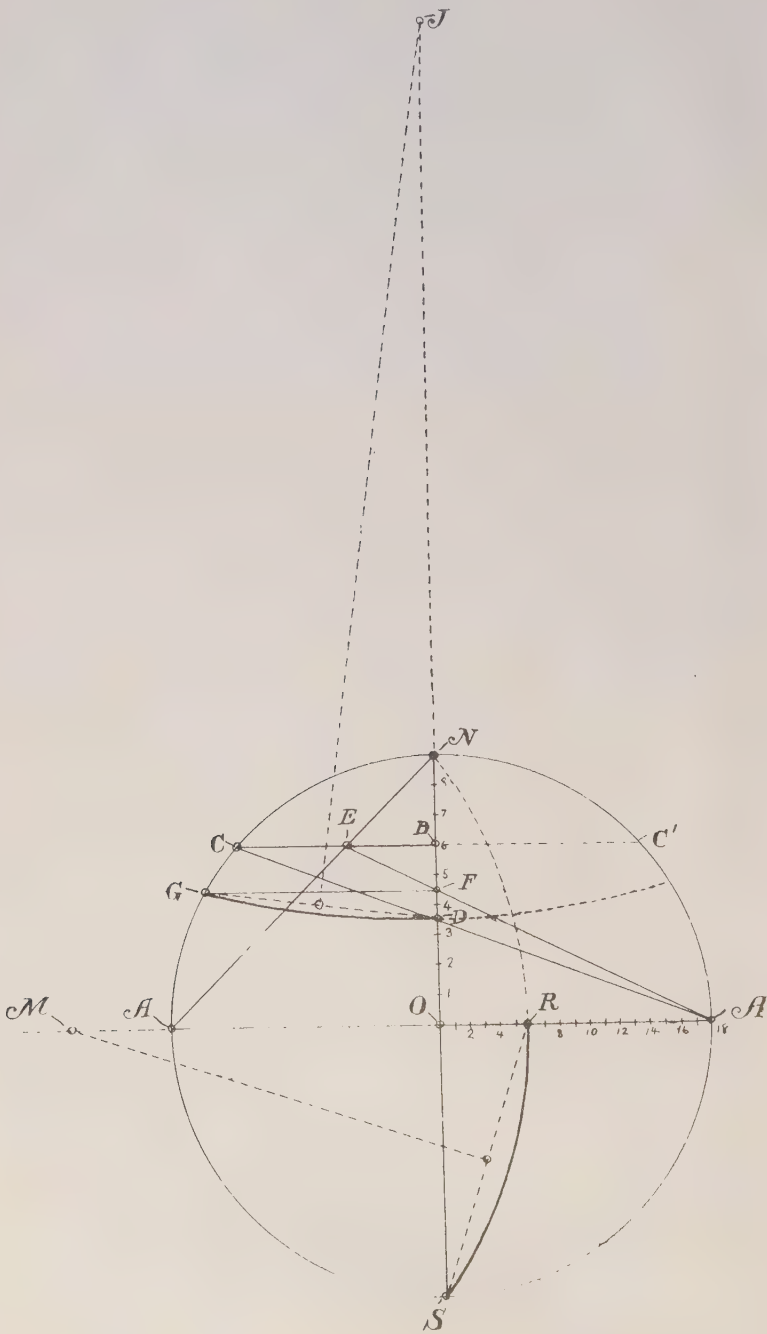


FIGURE 1.

By this method of construction the number of meridians shown is double the number of parallels, so that if the parallels represent ninety degrees on each side of the equator, or a total of one hundred and eighty degrees, the meridian lines will indicate three hundred and sixty degrees; and a map drawn with reference to this network of parallels and meridians is capable of representing the entire surface of the earth.

CONTINENTAL VIEW

FIGURE 2.

The new projection appears to occupy a middle ground between Mercator's nautical chart of the world and Mollweide's homolographic map of the world, avoiding the enormous distortion of the former, by which it becomes impossible to represent the poles at all, and greatly lessening the rapid departure from the true angles of intersection between the parallels and meridians which takes place in the latter. There is no distortion along the equator, and therefore the longitude on the map corresponds with the actual differ-

ence of time between places situated on the surface of the earth; but the distortion grows with increase of latitude, and becomes a maximum in the polar regions, where, however, the departure from the true size and shape of the earth's features is of the least importance for all the usual geographical and physical uses of maps

In the development upon a plane of any non-developable surface, like a sphere, certain errors are, of course, unavoidable; but any of these errors may be diminished, or even made to disappear altogether, at the cost of increasing some other. Thus in Mollweide's projection much has been sacrificed to secure the characteristic condition of strict proportionality between areas on the sphere and the corresponding areas of the projection; and likewise, in Mercator's, other useful attributes have been given up to attain the characteristic condition of the projection, that the track of a ship pursuing the same true course throughout a voyage will be represented by a straight line drawn between the ports of departure and destination.

Van der Grinten's projection appears to be without special characteristics of the kind just referred to, but to have been designed rather with a view of securing a natural and suggestive method of showing the whole world upon a single projection, in such a manner as to convey the idea of its globular form and to represent its main features without violent departures from their true shapes and areas.

THE FLOOR OF THE NORTH ATLANTIC OCEAN.

Sir John Murray has prepared a long paper and a map in which he deals with the "Recent Contributions to our Knowledge of the Floor of the North Atlantic Ocean." The paper is printed as an *Extra Publication* by the Royal Geographical Society.

The author says that the latest additions to our knowledge of the depths of the North Atlantic come from the expeditions of the Prince of Monaco and from several cable ships. The investigations which he takes into consideration are limited to the North Atlantic Basin between Lat. 20° and 60° N., excluding the tributary seas along the margins. The total area dealt with is about 6,875,000 square geographical miles. Between the limits indicated over 70 per cent. of the area of the sea-floor is covered by water

between 1,000 and 3,000 fathoms in depth, about 20 per cent. is covered by less than 1,000 fathoms of water, and 10 per cent. by more than 3,000 fathoms.

The shallow zone, with depths of less than 1,000 fathoms, forms a border around the North Atlantic Basin along the coasts of Africa, Europe, and North America and along the Iceland plateau which joins the British islands with Iceland. This zone includes the continental slope; and soundings have shown in some places what are believed to be submerged river basins or submarine gullies. This shallow zone also surrounds the islands and island groups and also submarine elevations that do not reach the surface. A list of 22 of the more important submarine elevations, or banks, is given.

The area covered by water between 1,000 and 2,000 fathoms in depth is about one-fourth of the total area. It extends along the eastern, northern, and western borders of the map, outside the shallower zone, and also extends uninterruptedly from the northern border down the centre of the ocean as far as the equator. This central ridge or plateau is probably the most striking characteristic in the bathymetry of the North Atlantic Basin. It is very irregular in outline, and is widest in the northern portion, between Lat. 30° and 50° N.

The area of the North Atlantic sea-floor covered by water between 2,000 and 3,000 fathoms in depth is nearly one-half of the total area. This zone forms two large irregular areas—one to the east, the other to the west of the central ridge or plateau. The eastern area extends as far north as Lat. 53° N.; while the western one reaches Lat. 58° N.

The area of the sea-floor covered by more than 3,000 fathoms of water is about $\frac{1}{10}$ of the total area. To these parts of the ocean basins the term "deeps" has been applied, and distinguishing names are applied to them. Sir John Murray briefly describes the ten "deeps" in the order of their size. The Nares Deep is the largest and most important in the Atlantic. Its maximum depth is 4,662 fathoms, and is situated to the south of Lat. 20° N. Within the limits of the area under consideration the Nares Deep covers over 500,000 square geographical miles of the North Atlantic.

From Sir John Murray's description it is evident that the bed of the North Atlantic presents the greatest divergences in its configuration. From the central ridge or plateau, as well as from deeper water, there rise elevations which form islands like the Azores, Madeira, the Cape Verdes, and Bermuda. On the other hand, what are called "deeps" descend about 20,000 feet below

the level of the waves. If the highest mountain in the world were placed in the Nares Deep it would form an island the summit of which would be about 1,000 feet above the water.

In discussing the temperature, salinity, and currents in the waters of the North Atlantic, Sir John Murray says that they present much greater variety and contrast than in any other of the great ocean basins. This arises from the general atmospheric circulation, which drives a large body of tropically-heated water of high salinity into the Basin, chiefly through the Gulf Stream, and at the same time forces a great mass of cold water of low salinity down from the Arctic Ocean. The temperature of the water at the bottom of the North Atlantic Basin in deep water is between 35° and 40° F. over nearly its whole extent. There is higher temperature at the lesser depths and lower temperature at the entrance to Davis Strait and in the Arctic Ocean. The average temperature over the floor of the North Atlantic is about 2° F. above the average temperature at the bottom of the Indian and South Atlantic Oceans; while the temperature of the bed of the Pacific is intermediate between these.

As considerably more than one-half of the area of the land surface of the earth, or about 26,000,000 square miles, drains into the Atlantic Ocean or its tributary seas, it happens that the detritus from rivers and icebergs is more widely distributed over the floor of the North Atlantic than in the other ocean basins.

The rock fragments collected from the sea-bed by the *Minia* and *Faraday* (cable ships) expeditions in 1903 have been carefully examined, and the conclusion is reached that they were transported into the regions visited, between 34° and 50° N. Lat., by ice from Greenland. Some specimens of rock obtained on the *Faraday* expedition were evidently broken off by the dredging apparatus and brought up in the grapnel. The evidence seems to show that most of these fragments were broken from transported boulders. There seems, however, to be conclusive evidence that volcanic rocks of recent origin project above the deposits on the sea-bed in deep water; but as yet there is no trustworthy evidence that any crystalline or stratified rocks project in this manner.

Besides the material transported from the land, there are now forming in the Atlantic great deposits of glauconite and phosphate of lime:

These are being laid down principally along the continental slopes in depths from 100 to 1,000 fathoms, especially along those shores where there is a great annual range of temperature. Glauconite seems to be intimately associated with deposits containing many fragments of continental rocks in process of alteration and decomposition, and phosphate deposits are more abundant where changing physical conditions bring about a great destruction of marine organisms. In the Spring of 1882, it is believed, the sea-bed for hundreds of square miles off the Atlantic coasts of the United States was

covered to a depth of six feet with dead fish and other marine organisms, whose destruction was brought about by the lateral shifting of ocean currents from different sources and of very different temperatures. In all regions of the ocean where similar phenomena take place large deposits of phosphate of lime and glauconite are now in process of formation.

The most striking feature of the deeper marine deposits of the North Atlantic is the large number of calcareous shells which they contain. It is now definitely ascertained that the vast majority in bulk of these calcareous shells belong to animals and calcareous algæ which live in the surface waters of the ocean. These organisms are much more abundant in the warm, salt, tropical waters than in the colder, less salt waters towards the poles and along the continents where rivers pour their fresh waters into the ocean. On the other hand, pelagic organisms which secrete silica for their shells, skeletons, and frustules are more abundant in the colder and less salt water towards the poles and off the mouths of great rivers, where the oceanic water is diluted by water from the land.

The remains of silicious organisms are not sufficiently abundant on any part of the sea-floor of the North Atlantic to form deposits to which the names of Radiolarian ooze and Diatom ooze have been applied. This probably arises from the large amount of detrital matter carried into the North Atlantic on the one hand, and on the other to the large amount of very warm and salt water in all the central parts of the basin.

Until the present time it has been impossible to form even the vaguest estimate as to the rate of the deposition of Globigerina ooze on the floor of the North Atlantic. It is now recognized, however, that a submarine cable is preserved when in contact with this deposit; and the condition of a cable that was lifted by the *Faraday* in 1903 in 2,300 fathoms makes it perhaps fair to assume a period of ten years for the accumulation of a layer of the deposit one inch in thickness at the place where this cable was lifted.

The area of the floor of the North Atlantic between the parallels of 30° and 60° N. Lat. covered by Globigerina ooze is believed to be 60.94 per cent. of the total area; blue mud, 26.76; red clay, 10.80; or a total area for these three deposits of no less than 98.50 per cent. of the area indicated. This leaves an area of only 1.50 per cent. of the total area for the remaining four types represented—viz., green mud, volcanic mud, pteropod ooze, and coral mud. The principal deposit type is Globigerina ooze.

MARINE FOSSILS NEAR THE SOUTHERN EDGE OF THE SAHARA.

Professor de Lapparent's notes on the finding by the French of marine fossils in the Sahara have been referred to in an earlier number of the Bulletin. The British members of the Anglo-French Commission which in 1903 delimited the boundary of the French and British possessions between the Niger and Lake Chad al-

brought home a considerable number of fossils that were studied at the British Museum by Dr. Bather and Mr. Bullen Newton, who came to the same conclusion that the French scientists had reached. Dr. Bather said of these fossils at a meeting of the Royal Geographical Society on June 27 (*Geog. Jour.*, Nov., 1904):

The fossils are shells and sea-urchins for the most part, and the important point about them s that they denote the existence of a rock of Eocene Age, which had not previously been found in that district. Rocks of similar age occur along the northern part of Africa towards Tripoli and Tunis. They are also known to pass through Arabia, and down towards Somaliland, but in the district south of Algeria no rocks of this age had been previously known to exist. It is true that some years ago Rohlfs mentioned that he had seen ammonites in the neighbourhood of Bilma, which is a little northwest of Chad, and Cretaceous rocks were found there by the officers of the French expedition, and also by Colonel Monteil. The existence of Eocene rocks is a point of importance, not merely as showing an extension of the sea over the southern part of the Sahara in those times, but as affording some confirmation of the views of Suess, who has supposed that, while the lower triangle of Africa was raised out of the sea at a very early geological age, all this Saharan part of Africa, together with the present Mediterranean, Arabia, and the North-West Provinces of India, formed one great Mediterranean Sea. We have here proof for the first time that this sea actually did exist down to Sokoto, or at all events a little to the north of Sokoto, forming the southern limit of the present Sahara. And what is an interesting point in these fossils, and still further confirmation of these views, is that some of the fossils that have been found are of a distinctly Indian character. One of the sea-urchins is of a kind which has hitherto only been described from Sindh. It is very interesting to learn . . . . that a species of the same genus has recently been found in Egypt.

We have, therefore, some evidence—pretty good as these things go—for a definite connection through Egypt and Arabia with the North-West Provinces of India. The Cretaceous rocks which have been proved by the existence of fossils have been proved to come down from the south towards Bilma, north of Lake Chad. . . . .

One of the fossils found by Colonel Monteil lay around for a long time, till Professor A. de Lapparent saw it, and recognizing its importance, had it described by a specialist in paleontology, who discovered that it was the same thing as a kind of sea-urchin which was found quite recently in Beluchistan, in fossils of Cretaceous Age there. Here we have a proof of the connection of India and the Sahara in Cretaceous as well as in the later Tertiary times.

SEMI-CENTENNIAL OF THE AMERICAN GEOGRAPHICAL SOCIETY.

The fiftieth anniversary of the incorporation of the American Geographical Society was commemorated by a dinner at Delmonico's restaurant on the 21st of December, 1904.

One hundred and fifty Fellows and their guests were present.

During the dinner views of a geographical nature were exhibited on the screen.

After dinner toasts were drunk to the President of the United States and the American Geographical Society.

Letters and telegrams of congratulation were read from the officers of the Geographical Societies of Paris, Berlin, Geneva, Vienna, Antwerp, Rome, Budapest, London, and other cities of Europe and America.

Prof. Libbey then read a concise statement of the history of the Society, which was organized May 22, 1852, with George Bancroft as President, and Henry Grinnell, Francis L. Hawks and John Zimmerman as Vice-Presidents. The Society was incorporated under a special charter, April 13, 1854.

Mr. Bancroft held office until December, 1855, when he declined re-election and was succeeded by Dr. Hawks, who remained in office until 1861. Mr. Henry Grinnell succeeded Dr. Hawks and held office until 1864, when Charles P. Daly was elected. Judge Daly was one of the earliest members of the Society, which he joined in 1855, and he continued to serve as President until his death in 1899. Judge Daly was succeeded, in 1900, by the Hon. Seth Low, who retired at the close of the year 1901. Commander Peary was elected President in January, 1903.

At this point, before introducing the speakers of the evening, President Peary said:

You have heard these unadorned facts in regard to our Society. Eighteen years ago I met Judge Daly for the first time, only to love and revere him, as did every one brought in contact with him. During the years following that time Judge Daly and the Society were constantly my friends. Only during the past two years, however, have I had the honor to be associated directly with the Society. These circumstances put me in an unusually favorable position to speak freely of the Society without incurring the criticism of self-adulation, and to speak of it in a way in which not one of the solid, unostentatious men sitting here at the table with me to-night, who have put the Society in its present position, could be prevailed upon to do.

As Prof. Libbey has just said, our Society has a beautiful home, surpassed by that of no other similar Society. That home is a monument to those who contributed of their means to make it possible, and it is a monument to the indefatigable efforts of the Building Committee (of which Henry Parish and D. O. Mills were members) which moulded the funds into the present beautiful structure.

The Society is to-day, after years of struggle, in a stable financial position. It has, through the munificence of Gen. Cullum and Judge Daly, two gold medals, not surpassed in beauty of design and intrinsic value by the medals of any other Geographical Society.

The last fifty years have been a period of growth for this Society. Now the Society is developed and equipped, and the next fifty years should be a period of activity. There is ample work on land and sea for the Society, ample room for a closer association with the business and commercial interests of this great city, ample room for a closer affiliation with the increasing geographical expansion of the Nation.

And a Society which has on its Board of Directors such men as D. O. Mills, Henry Parish, Anton Raven, and others too numerous to mention, will have availed itself of its utmost privileges and made use of its full capabilities only when it is a vitalizing influence, felt not only in this city and country, but in every portion of the civilized world where enlightened men and women feel an interest in the study of the world upon which we live.

President Peary then introduced the Hon. C

President of the Board of Aldermen, who spoke for the City of New York.

President Peary then called upon the Hon. Seth Low, ex-President of the Society, who said of the opportunities before the geographer:

The man who explores to-day does not go single-handed. He has more powerful eyes at his command than Argus ever controlled. With the scientific astronomer by his side he can pierce the vast distances of space. With the botanist and biologist of his party he can try the secrets of the invisible dust. So that the work that remains to be done may be illustrated, I think, by an expression which the artist Gibson once used in a lecture that I heard him deliver. He called the lecture "Things that I Saw at Midnight," and with his finely-trained eyes he was able to identify hosts of living creatures that I could not identify in broad daylight, if they were even then visible.

So that it is not the light that shines, but it is the eye that looks, that determines the vision. And unless it be supposed that the earth has revealed all her secrets to those who have turned its pages, with scanty equipment of scientific knowledge, I think that we may steadily and sturdily believe that the geographical exploration of the future may surpass even the accomplishments of the past in its importance to mankind. I suppose it is not a science like electricity that men are most apt to undervalue in the past, because the immense development of its application within the last twenty years has been so marked; and yet even in electricity we need to remember that it was the patient men of the past that made the modern development possible. Precisely so in this field of geography, or rather, here if anywhere, men are apt to be discouraged by the thought that everything has been accomplished. But we may be sure that there are still opportunities for the able and the gifted explorer to write his name upon the scroll of eternal fame.

President Peary then introduced Capt. A. T. Mahan, who spoke as follows on the United States and the Pacific:

Consider what it meant to America that England was the country nearest to the United States, excepting France and Spain. Search your historical knowledge and see what the effect of those facts has been upon the history of the world. What an enormous thing it is that first of all England got her foot upon this northern continent of America! Consider the development that went on from that time because of that geographical position, principally, and because of the great sea power of England, how gradually English conditions and English traditions, and the law of England and the whole social condition of England forced themselves upon these shores of America and became the leaven by which this country has been leavened. Consider how in the discretion of Providence years passed before any other peoples, except those of England, in any great numbers set their feet here upon the North American continent. Think what it was when our development was held back, as it was until the English traditions of law and political liberty had become familiarly set upon the American continent; and after that was so far established as to make it impossible to shake it, then the floodgates were opened and we have had thrown upon our shores the surplus population of Europe, but not at so early a date that it was possible to swamp the tradition of constitutional law and liberty and order in which the hope of our country consists at the present time.

Now, I say, [illegible] that lesson of the past and apply it to the United States and [illegible]c at th[illegible]sent time, and at this period of doubt and uncertainty, when men be[illegible]rope a[illegible] An[illegible]

do not know where all these things are going to lead us, when we have crystallized public sentiment to a certain extent into imperialism and anti-imperialism, and consider what it means. And from our geographical position you will find that it must inevitably follow that the United States must go on and cannot help going on with all that the United States stands for in the matter of political liberty and political order, to impress itself upon the farther borders of the Pacific, not by conquest, but by precept and example—not by interfering with the people in any illegitimate manner, but simply by mingling with them, by being what through the Providence of God, by reason of the geographical relation of Great Britain, we have become; and what from our geographical position we almost inevitably must become toward the farther countries, not by conquest, not by settlement, but simply by association and by being what we are and ought to be. That, as I conceive, is the relation of the United States to the Pacific Ocean.

President Peary then introduced Mr. William Barclay Parsons, who spoke on the Panama Canal:

When the French Company turned over this canal to the United States Government some nine months ago, and the Commission took possession of it, it was generally expected that active work would be begun in the near future. Unfortunately, that has not been the case. But the nine months that have already gone and the other months which must yet follow before active work can be begun have not and will not be lost. The first French Company undertook to build a canal at sea-level. It finally failed, and a new company came in to take up the work. It had a broken credit and it had a concession whose life was about to expire. It was, therefore, compelled to devise, not the best canal, but to devise a canal that could be built within a certain maximum limit of money and within a very short limit of time.

The United States is not subject to either of those limitations. Unfortunately, we found that the studies of the last French Company (because the first French Company had made very few, if any) had been confessedly toward the thing that I have just described, and it therefore became necessary for this Commission to begin where the French companies were supposed to have begun many years ago, and for the first time make a thorough study of the conditions existing upon the Isthmus. Until the surveys and studies have been completed, until we know more about the geography and geology and the topography of the Isthmus, it is most premature, and, in fact, impossible, to make any statements in regard to the type of the canal. If a canal can be built without locks, so that Capt. Mahan can send his largest battleships, and so that you gentlemen of commerce can send your largest passenger and freight steamers through without the delay of locks, except the tidal lock that will have to be constructed at the Pacific end, obviously that is the best canal that can be built. But in the first place we must determine what that canal is to cost and how long it will take to build it. And when those figures have been obtained, when we have that necessary knowledge to form a judgment, then we shall have to decide whether this Government can afford to pay the bill both in time and in money.

Baron Kaneko, formerly of the Imperial Japanese Cabinet, was then introduced by President Peary. He said in part:

I should like to say a few words in connection with your President's statement that this is the fiftieth anniversary of the founding of your Society. It is a curious

coincidence. This year is the fiftieth anniversary of the first treaty signed by Commodore Perry with the Empire of Japan. So the birth of your Society is connected with the birth of our modern advancement, and it is most delightful to me to have the opportunity to say a few words on behalf of the Japanese Empire. My country and my people owe everything, all their progress and achievement, to the good offices of the United States. So that with whatever laurels of honour we are crowned they were given by you by the making of that treaty just fifty years ago, when you were founding your Society in this great City of New York. . . .

The President introduced Mr. Henry G. Bryant, President of the Philadelphia Geographical Society, who tendered the congratulations of his Society, and continued:

I believe American geographers fully appreciate the large share borne by this Society in entertaining the members attending the recent Geographic Congress, and I think that if that Congress accomplished nothing else it has brought about a better understanding between the Geographical Societies of this country. I believe that every American who attended that Congress in New York took special pride in showing to our distinguished foreign delegates the noble home of this Society, the like of which I have seen nowhere in America or in Europe, and I feel also sure that those strangers, on returning to their homes, will have a full appreciation of the dignity which our science has attained in this Western World. . . .

There are two men who have probably done more to interest me in geography than any others I have met. Both men were Presidents of this Society. I refer to the late Charles P. Daly and Commander Peary—the one the kindly and lovable gentleman and the enthusiastic student of geography, the other the gallant explorer of the Far North.

THE PRESIDENT: Ladies and Gentlemen, this closes the order of exercises for the evening. We bid you God-speed until the next dinner of the American Geographical Society.

THE INVESTIGATION OF ALASKA'S MINERAL WEALTH.*

BY

ALFRED H. BROOKS.

The developments of the last five years have shown that Alaska, as a field for mining, stands in the first rank among the possessions of the United States. Its annual gold output is now about $8,000,000. It produces silver, copper, and coal in commercial

* Published by permission of the Director, U. S. Geological Survey.

Mr. Brooks, who is the Geologist-in-Charge of "The Division of Alaskan Mineral Resources" in the U. S. Geological Survey, read this paper before the American Institute of Mining Engineers at its Lake Superior meeting in September last. It is reproduced here because it is the authoritative presentation of the facts relating to a subject of large public interest. Mr. Brooks's data cover the subject to the close of 1903. To complete the review, readers are referred to "Notes on Topographic Surveys in Alaska, 1904," in the November BULLETIN, pp. 699–701. The accompanying map is based upon that with which Mr. Brooks illustrated his paper. A complete bibliography of the U. S. Geological Survey publications on Alaska, including maps, is printed in *Bulletin* 227 issued by the Survey.—THE EDITOR.

quantities, and its recently-discovered tin and petroleum promise to become important products. Concurrent with the gradual development of this wealth, the mining public has ceased to regard the territory simply as an Arctic province where a few placer-miners struggle with adverse conditions to secure a grub-stake or a modest fortune. Of late years there has been a large influx of capital to investigate its mineral resources, but in its area of nearly 600,000 square miles there still remain large unexploited and little-known fields.

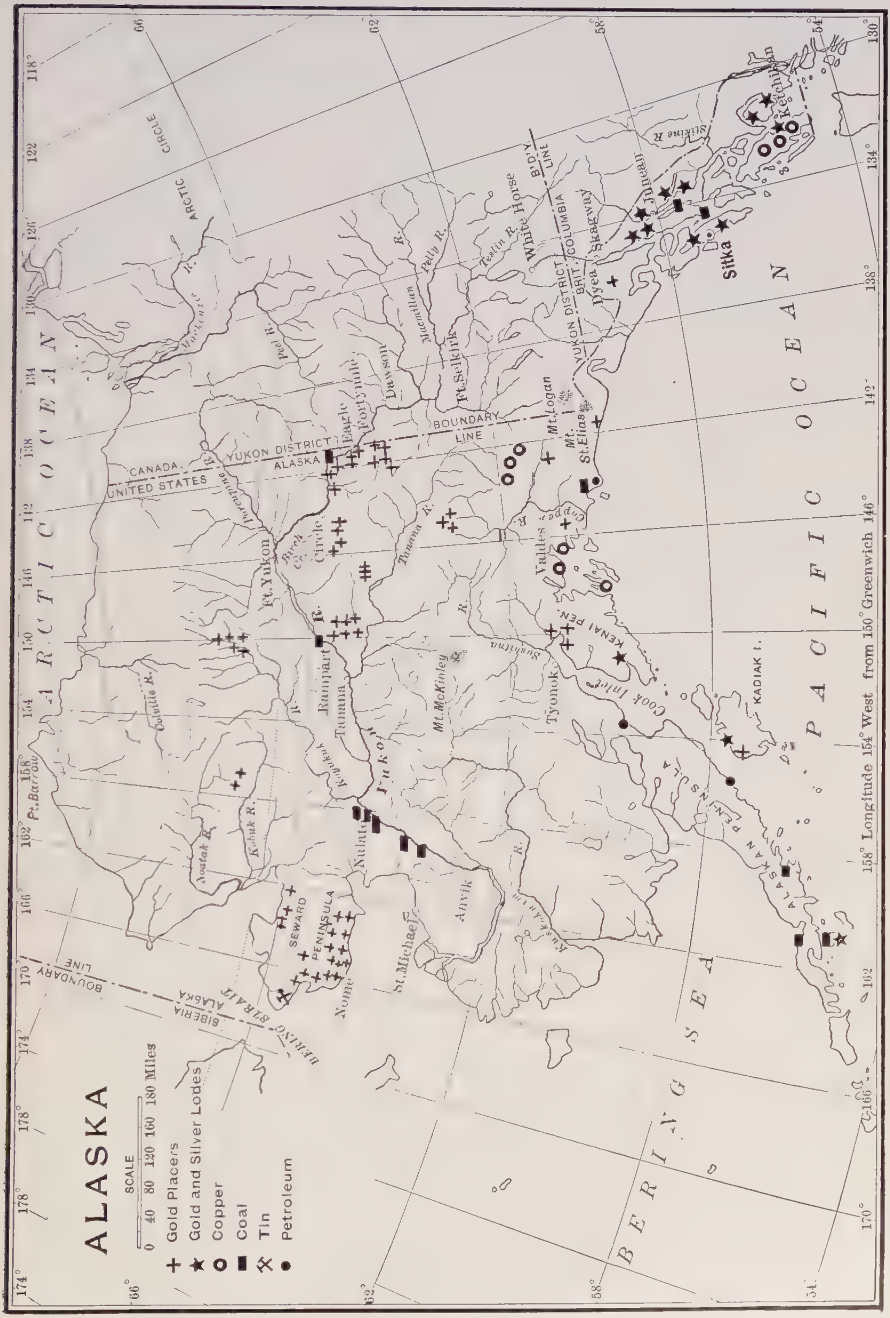
This work of investigation has been carried on under adverse conditions, and reflects credit on all who have shared in it, whether prospectors, mining engineers, or geologists. It is the purpose of this paper to outline briefly what has been and is being accomplished toward furthering the knowledge of Alaska's mineral wealth, and in this connection to present a brief history of the operations of the United States Geological Survey in the Territory. A list of the publications of the Geological Survey which pertain to Alaska will be presented as an appendix, in the hope that it may prove useful to those who are interested in the mining of this northern province.

During the Russian occupation of Alaska, from 1783 to 1866, but little attempt was made to delineate its geographic features or to study its geology and mineral resources. The Russian-American Company, which long held control of the Territory, was entirely absorbed in the exploitation of its fur trade, without concern for its other possibilities. During the last decades of the Russian régime, however, the Fur Company was compelled by Imperial ukase to choose its administrative head from among naval officers, and some of these governors, notably Wrangell and Tebenkof, were men of scientific attainments and interests, under whose administration the finances suffered somewhat, but the cause of exploration was materially advanced by attempts at charting the coastal region, and even by an occasional expedition into the interior. From these surveys, supplemented by the efforts of navigators and explorers of various nationalities—chiefly English—was obtained a fairly complete knowledge of the entire coast-line of Alaska, and some geographic data concerning the lower courses of the Yukon, Kuskokwim, and Copper Rivers. Many of the expeditions included naturalists who made geologic observations and palæontologic collections, which eventually found their way to various scientific institutions of Europe; but, at best, the results were merely fragmentary. It was the policy of the Russian-American Company to

discourage the development of any mining interests within the territory, out of a belief that mining would be inimical to the fur-trading interest. When, however, the administration of the naval governors combined with the decrease of the fur-bearing animals to bring about a diminution of revenues, an abortive search was made for mineral wealth. A mining engineer by the name of Doroshin was dispatched to Sitka in 1848, and spent the succeeding two years in examining the islands thereabouts and in the Cook Inlet region; and he did, in fact, make the first discovery of gold in Alaska. But as the returns from nearly a year's work of some 40 men yielded only a few ounces of placer-gold, obtained near Cook Inlet, he reported adversely as to the presence of gold in commercial quantities, thus terminating the only Russian attempt at gold-mining in Alaska. The current reports of evidences of Russian placer operations in various mining districts have so far proved to be without foundation.

Doroshin did, however, recommend the mining of coal at Cook Inlet, and the demand created by the gold discoveries in California led to the establishment of such an enterprise on Port Graham, in 1852, but without commercial success. The Russians made no other attempt at developing mineral resources, unless the shipment of ice to California, carried on in a desultory manner for some years, can be regarded as such.

The Russian traders had pushed their way a thousand miles up the Yukon, and had explored the lower stretches of the Kuskokwim and Copper Rivers; but previous to 1865 little was known of the interior of what was then called Russian America. In that year it was reported at Sitka that American prospectors had found gold on the Stikine River, and an expedition was dispatched to verify the rumour and establish the International Boundary. With the party went Professor W. P. Blake as geologist, among the first of Americans to investigate the geology of Alaska. From the east the interior had been penetrated by the traders of the Hudson Bay Company, who, following the routes marked out by such explorers as Franklin and Mackenzie, had reached the Yukon in 1849; but they, too, were adverse to the development of mining industries, and made no attempt to investigate mineral resources. In 1865 the Western Union Telegraph Company organized a survey of northwestern America to find a route through Canada to Bering Strait, in order to connect by cable with a line crossing Siberia from Europe. The success of the Atlantic cable led to the abandonment of the project, but the investigations of the scientists and



MAP SHOWING MINERAL DEPOSITS IN ALASKA.

explorers of the expedition were of lasting importance; though, except for the work of Dr. Wm. H. Dall, the most prominent member of the parties, they were of solely geographic interest. Dall continued his work in Alaska as a member of the Coast Survey after the transfer of the territory.

In 1866 Russia ceded her North American possessions to the United States for the sum of $7,200,000, and Russian America became Alaska. The interest awakened by the addition of this vast domain was only short-lived among the mass of the American people, the majority of whom regarded it as an Arctic province possessing no value outside of the fur trade. Few, if any, dreamed that this isolated possession was destined to become a great mineral producer, and that in the course of one generation its annual gold output would exceed by over a million dollars the price paid for the entire territory.

The apathy of the public and the neglect of the executive and legislative arms of the Government relegated the new possession to temporary oblivion. For twenty years after Alaska passed under the control of the United States systematic surveys were limited to its coast-line. Explorations in the interior were fostered by the various branches of the Government and by private enterprise, but only intermittently and without definite purpose. Thus, while there developed gradually a somewhat more exact geographic knowledge of our new Territory, no light was thrown on its mineral resources. But while the Government's interest in this virgin field lay dormant it soon attracted the ever-active American prospector. As already noted, he found gold on the Stikine even before the purchase of Alaska. Following this came the discovery of auriferous quartz near Sitka in 1879, and of gold in the Juneau placers in 1880. It was the development of the latter which led to the finding of the gold-bearing lodes that have made Juneau the foremost mining-camp of Alaska. The restless pioneers, soon finding means to overcome the opposition of the natives to the white men's penetrating the interior, made their way across the Chilkoot Pass, and while descending the Lewes River came upon more gold. In 1886 the gold-placers of the Fortymile region were discovered, and the discovery of other districts followed rapidly during the succeeding decade.

These Yukon pioneer miners were dependent entirely upon their own resources, formulated and executed their own laws, and were practically ignored by the Territorial and Federal Governments. It is largely to their perseverance and pluck that the country now owes

its millions of revenues from the Alaskan placer-fields. Not until 1895 did Congress awake to the importance of examining into Alaska's mineral wealth. In that year $5,000 was appropriated for an investigation of its coal and gold resources by the U. S. Geological Survey; and, small as the sum was—considering that the territory to be investigated was two and one-half times the size of Texas, and that the field of investigation lay two or three weeks' journey from Pacific Coast ports—this was the first organized attempt in this direction.

The party which was sent out spent the summer of 1895 in an extensive examination of the Pacific coastal belt, and accumulated valuable information regarding the distribution of the coal-bearing rocks and the character of the gold deposits.

In the following year a similar appropriation was made, and a party of three was sent inland to study the placer-districts along the Yukon River. This long journey, at a time when few had penetrated to the Yukon gold fields, was accomplished at the expense of considerable hardship, the party succeeding in visiting all of the producing gold-camps of the Yukon, among which were numbered at that time Fortymile, Birch Creek, and Minook districts. The investigation could not be continued in 1897, because the Appropriation Bill failed to pass in time to make the funds available in this distant province. It was the discovery of the Klondike gold-placers in 1896 that opened people's eyes to Alaska's importance, and, as the facts became disseminated during the following two years, public opinion on this point rapidly changed. There was then pressing demand for reliable information about the northwestern part of the continent. This was met on the part of Congress in 1898 by appropriations for various bureaux for Alaskan investigations to be made by the Government; and the amount to be expended by the U. S. Geological Survey for this purpose was increased to $20,000. Under this latter appropriation the U. S. Geological Survey began the series of systematic surveys in Alaska which it has continued to the present time.

The task before it was not an easy one. Here was an area of from 500,000 to 600,000 square miles, of which little but the coast had been surveyed and very large areas were almost unexplored. The province to be investigated was far distant, and the season of operations limited to the summer months. Moreover, the work must be so conducted that the results should be available at the earliest possible date. No plans which required more than one season for their execution could be considered, for there was an

urgent demand on the part of the thousands who were working blindly in this northern region for immediate information. It is plain that these conditions could not be met by planning detailed and final surveys, which, while of the utmost importance to a mining community, must be preceded by explorations and reconnaissances. Moreover, the fact that the work had to be begun within a month from the time the Appropriation Bill passed left little time to formulate plans and organize parties. Fortunately, the U. S. Geological Survey was able to draw on a corps of geologists and topographers who had been trained in other fields for work of this character.

It was decided to send four parties to Alaska—one to map an area lying close to the new Klondike placer-fields, and the others to conduct extensive explorations. One of the latter made a reconnaissance of the Sushitna River valley and crossed the divide to the Cantwell, mapping the topography aud geology as far as the means would permit and determining the position and altitude of Mount McKinley. Something was learned regarding the distribution of the placers in the Sushitna valley, and the source of the gold was traced to small quartz-seams in metamorphic slates.

Another expedition ascended the Skwentna from Cook Inlet, portaged along the Alaskan range to the headwaters of the Kuskokwim, and, following this great river to the sea, then turned eastward, and, partly along the coast and partly inland, made its way back to the Pacific Coast, completing in four months a journey of more than 1,400 miles.

The other party, which was distinctly topographic, made its way inland along the same route and mapped some 2,000 square miles lying chiefly in the placer district of the Fortymile region.

On its way inland, the third party followed the then much-travelled Klondike route as far as the mouth of the White River, ascended that for about 100 miles, then crossed to the waters of the Tanana by portage, and followed that river to its mouth. The report of the topographic and geologic results of this expedition contained suggestions in regard to the distribution of placer-gold which have been verified by the recent discoveries in that field.

In that same year the U. S. Geological Survey was enabled, by the courtesy of the War Department, to assign two of its geologists to accompany army expeditions into the interior of Alaska. The one conducted explorations in the Copper River basin, while the other made its way inland from Cook Inlet.

At the close of the season of 1898 the reports of these different

reconnaissances and exploring expeditions not only increased the geographic knowledge of Alaska, but contained much practical information in regard to routes, trails, and timber, as well as to the geology and mineral resources.

In 1899 the investigation was continued by two expeditions—one across the country from Pyramid Harbour on Lynn Canal to Eagle City on the Yukon; and the other from the Yukon north to the Koyukuk. The first made its way along the northern front of the Saint Elias range, across the headwaters of the White to the Tanana, and, thence turning northward, reached the Yukon by a route through the Fortymile placer-district. On the way a hasty examination was made of the Porcupine placer-district and Fortymile region. What was still more important, it was definitely established that copper occurred in placers at the headwaters of the White and Tanana Rivers; and the metal was traced to its bed-rock source.

The second party ascended the Chandler, a northerly tributary of the Yukon, and, reaching the basin of the Koyukuk by portage, followed that river to its mouth, giving special attention to the little-known placer-fields of the region.

The accompanying map gives the distribution of the mineral products of Alaska as far as is known at present.

Towards the close of the season of 1899, the two parties combined and utilized the few remaining weeks in visiting the newly-discovered gold deposits of Nome, thus gaining material to publish a preliminary report on this important placer-field in the following winter. The wide circulation of this report instances the value of early publication of results.

The increase in gold output of the Seward Peninsula, from $15,000 in 1898 to more than $2,000,000 in 1899, excited an interest which rivalled that shown in the Klondike. From the 20,000 people who went north during the summer of 1900 there arose an urgent demand for topographic surveys and information in regard to the mineral resources of the district. To meet these new developments, the purely exploratory work of the Survey was set aside for the time being, while activities were directed to a real mapping of the newly-discovered fields. About half of the Alaskan forces were concentrated in the Seward Peninsula. These in the course of one season not only completed a contoured map of an area covering more than 6,000 square miles, but made a personal investigation of every placer-district and practically every creek of the southern half of the peninsula; as a result of which a report was issued the

following year, showing the distribution of the gold-bearing gravels, the source of gold and its mode of occurrence. The question of bonanzas in the placers was the subject of special discussion. The theories advanced as to their probable origin have, in most cases, been confirmed by later developments in the region.

The discoveries in this season of workable placers in the high bench, tundra and elevated beach-gravels of the Seward Peninsula furnished further proof of the value of geologic work; for the report of the previous year, in calling attention to these gravel-deposits, then entirely unprospected, had dwelt upon the probability of their being auriferous. A similar instance was the discovery by a member of the Survey of stream-tin in the York region.

In the Copper River region there had been seemingly important discoveries of copper, and an urgent demand came from capitalists, mine owners, and engineers for more authentic data. To meet this demand a large force was dispatched to the new district and an area of some 5,000 square miles was mapped topographically on a scale of 4 miles to the inch. Within this belt a geologic reconnaissance map was made, and the general occurrence of the copper-bearing rocks was determined, while individual prospects were examined as far as possible. The report which resulted from this work was of such a character that mining engineers had definite basis for making preliminary estimates on the cost of railroad construction, as well as considerable data on the probable extension and value of the copper-deposits. The same season a more hasty examination was made of the copper-deposits of Prince William Sound.

In 1901 the work in the Seward Peninsula was extended to the northward by a reconnaissance survey of about 5,000 square miles. Some additional information was obtained regarding the distribution of stream-tin, and considerable areas were examined in sufficient detail to enable a fairly definite statement to be made regarding the presence and absence of placer-gold. A most valuable feature of the work, in the light of after-developments, was the outline of some granite intrusives, for it is along the contact of the sediments and granites that tin-deposits have been discovered.

The same year witnessed very important explorations in northern Alaska. One party, which had to travel 1,200 miles by dog-teams in mid-winter, made a reconnaissance survey from the Yukon northward to the Arctic Ocean, traversing a mountain range which, up to that time, had never been visited by white men, and at the close of the season contrived a hasty examination of the Cape Lis-

burne coal fields. Another survey, carried from the Yukon to Kotzebue Sound, has proved of particular value to the prospector since the discovery of placer-gold within the area surveyed.

During this season the Ketchikan mining district of southeastern Alaska also was subjected to a preliminary examination. Nearly 200 prospects were visited and reported upon, and a geologic reconnaissance map was made of an area covering about 2,000 square miles.

To meet the growing demand for information in regard to the Copper River basin, two parties were sent into this district in 1902. These, besides completing the reconnaissance topographic and geologic mapping of the basin, extended the work both to the north and south. A detailed study was made of the Chistochina gold fields, as well as of the northern copper field, which had received a preliminary examination in 1869.

The growing importance of the Yukon placer-fields and the consequent traffic on the Yukon River had led to a number of only partially successful attempts to mine coal for local use in that field. With the idea of furthering these interests, a party was dispatched to make a special study of the coal. The results showed that there were large areas of coal-bearing rocks on the Yukon, and that while the upper river coals were, for the most part, of lignitic character, some of those along the lower river, which are of a lower geologic horizon, can be graded as semi-bituminous, and should afford a local fuel supply.

Hand in hand with these special geologic investigations, geographic mapping has proceeded by a series of reconnaissance surveys. In 1902 an exploring party made its way from the head of Cook Inlet through the Alaskan range, along its northwestern base to the Tanana River, and thence to the Yukon, completing an 800-mile journey in three months and a half. Yet topographic surveys were maintained throughout, and much was learned of the geology, as well as of the mineral resources. An area of coal outlined on one of the southern forks of the Tanana, though of no immediate importance, has possible future value, for it lies near the route of a proposed railway from Cook Inlet to the Yukon.

The demand in southeastern Alaska, where large capital has been invested in mining-plants, is for detailed geologic and topographic maps. But the great cost of such surveys unfortunately prohibits their extension with the rapidity required by the mining developments. The beginning was made in 1902 by mapping an area of about 80 square miles in the vicinity of Juneau on a scale of one mile to the inch.

With improved transportation facilities, and better organization of the work, came a material decrease in cost, which enabled the U. S. Geological Survey to send seven parties in 1903. To one of these was assigned the task of completing the reconnaissance mapping of the Seward Peninsula, of which there are fairly accurate maps. At the same time an examination of the newly-discovered placer-fields in the northeastern part of the peninsula was made.

The general policy of the Survey is to keep in touch, as far as the appropriations will allow, with all mining interests, and to publish from time to time supplementary reports based upon new data thus obtained. Thus, when the rapid developments in the older districts of the Seward Peninsula created a demand for further geologic investigation, a party was sent to make a tour of nearly all the important mining-camps in the region. An interesting result of this work was the tracing of the tin to its bed-rock source. Though it is too soon to predict commercial importance for this new discovery, yet all indications are sufficiently favourable to stamp this as an excellent example of the importance of scientific investigation in a new mining district and a most striking case of the practical value of geologic work.

While every effort has been made to keep abreast with conditions in the more important mining-camps in Alaska, at the same time the lesser ones have not been neglected. The Yukon placer-fields have been steadily developing, though at a much slower pace than those in the Seward Peninsula. To meet the great demand for accurate maps and information, two parties were sent into the Yukon country in 1903—one for a topographic survey extending from Eagle City to the Fairbanks district and thence northward to Circle City, and the other to subject the placer-fields of the Forty-mile and Birch Creek regions to a re-examination, and also make some preliminary studies in the newly-discovered Fairbanks district.

The work of the previous year had thrown some light upon the occurrence of the coal on the Yukon, but important stratigraphic problems still remained to be solved, which, while they had no immediate economic value, were still of sufficient practical importance to deserve a share in an investigation of the mineral resources. With this in view another party was sent down the Yukon in 1903, which obtained still more evidence in regard to the age and distribution of the coal.

Mention has been made of the detailed topographic survey of

the region lying adjacent to Juneau. This district came in for geologic investigation in 1903, and the reconnaissance mapping was continued over an additional area extending from Port Houghton to the Porcupine gold-district. The former received a detailed examination, and by careful study of its important mines the relations of the ore-bodies were determined and important conclusions reached in regard to their distribution.

While the interest in Alaska centres chiefly in its placer-mines, yet during the past three years considerable prospecting for petroleum has gone on. The successful boring of a well in the Controller Bay region and the favourable indications in the Alaska Peninsula led the U. S. Geological Survey to dispatch a party in 1903 to make a preliminary examination. Reconnaissance surveys in the Controller Bay region and in the oil fields of Enochkin and Cold Bays on the Alaska Peninsula yielded much data as to the geologic conditions of the petroleum distribution. While these studies were only preliminary and cannot be considered conclusive, they at least show that these districts give promise of producing oil and that drilling wells can be considered a legitimate operation. Furthermore, it was definitely ascertained that there are workable coal-seams of a semi-anthracitic character in the neighbourhood of Controller Bay. As this coal is of the highest grade yet found on the Pacific Coast, it promises, in spite of the somewhat adverse conditions for shipping, to become an important resource of the Territory.

In the foregoing an attempt has been made to outline briefly the character of the work which has been performed for the investigation of Alaska's mineral resources. While it is believed that the results are of practical value—a view which is borne out by the strong support that the U. S. Geological Survey has received from the mining men of Alaska—yet it is only too evident that much remains to be done, and that all of the investigations so far are only preliminary. It will be many years before exhaustive studies can be made, such as are now being carried on in many of the mining districts of the United States.

In July, 1903, the Alaskan surveys, which had been at first a subordinate function of the geologic and topographic branches of the U. S. Geological Survey, were organized as a distinct division, entitled "The Division of Alaskan Mineral Resources," and its administration was vested in a Geologist-in-Charge. The force of workers, which in 1899 numbered only two geologists and two topographers, now includes ten geologists with two assistants and

three topographers with three assistants, besides an additional field force of some thirty men.

It is difficult at the present day to conceive how little was known of Alaska previous to 1898. The expeditions of earlier years had contributed something to the knowledge of the country drained by the Yukon, and more or less indefinite information was available in regard to a few other parts of Alaska, but the country as a whole was practically unknown. Many of the most important geographic features have been added to the map by the reconnaissance and exploration surveys of the years from 1898 to 1903, during which the principal mountain ranges have been outlined and the drainage areas defined.

A most important function of the Alaskan surveys has been the production of contoured maps, the value of which cannot be overestimated. There are demands for them from prospectors, engineers, and capitalists, who find in them an essential aid toward the development of the country along any line. They indicate routes of travel to the prospector and explorer, railway and wagon routes to the locating engineer, and possible sources of water supply to the mine operator. During the six years that systematic work has been carried on an area of between 90,000 and 100,000 square miles has been covered, representing about one-sixth of the total area of Alaska.

While the aim of the work has been to investigate mineral resources, this has, of course, necessitated geologic studies, for it is only through the medium of a thorough geologic knowledge that the facts gathered in regard to the value and distribution of ore-deposits can be practically and scientifically interpreted. From year to year this fundamental knowledge is growing, and in the course of time the geologic history of the Territory will be deciphered. In fact, much is already known of the general succession and distribution of the many bed-rock formations.

The studies of the bed-rock geology contributed by each expedition are resulting in an accumulation of material which becomes increasingly valuable in tracing the distribution and origin of deposits having economic importance. The occurrence of such deposits is but a minor feature of the general geology, but the most important factor in the development of the country. The Survey's function is to study the relation of the two, and, in the course of the studies, results have often been achieved of immediate practical importance to the people of Alaska.

In the preceding paragraphs of this paper reference has been made to the various classes of economic investigations which have been carried on in Alaska. This work is but fairly begun, for nearly all of the examinations have been of a most hasty and preliminary character. It has been the aim to establish general relations, and to give the mining public the benefit of these by early publication of reports, leaving detailed studies to future years, when developments will prove such as to warrant their cost. By pursuing this policy the Survey in the course of the past six years has been able to obtain some information from every mining-camp in Alaska, and this has, for the most part, been promptly published and widely disseminated. Recently Congress has manifested its interest in Alaskan mining affairs by increasing the appropriation for investigation of the mineral resources to $80,000. This sum will make it possible to push the work at a pace more commensurate with its importance. The Survey's aim will be to keep abreast, if not in advance, of mining developments.

The large investments made in water-supply ditches, pumping plants, and mining machinery in the Seward Peninsula have shown the need of detailed surveys in this field. Though mine operators have many times been witnesses to the value of the present reconnaissance map, the magnitude of the mining operations now necessitates a demand for detailed maps*. Surveys for this will cost from five to ten times as much as the preliminary ones, but when completed will give the mine operator a thoroughly reliable basis for his engineering work. While this will constitute the only immediate value of the contoural maps, yet they will prove of no less importance as a base for detailed geologic studies. These latter will not only determine the distribution of placer-gold, but will throw light on the much-mooted question as to the presence or absence of commercially valuable auriferous veins. There is a like demand for surveys in the Yukon placer-field, but, here, developments have not yet advanced so far as to outstrip the usefulness of reconnaissance maps. These should, however, be pushed to early completion ; after which should follow detailed mapping of areas containing placers which prove to be of high commercial value.

In the Cook Inlet placers the surveyor may see another field which demands attention. It has been the scene of such mining activity as to warrant topographic and geologic surveys, but be-

* This demand was partly met by the Surveys of 1904. See BULL. A. G. S., p. 700, Nov., 1904.

cause of the urgency of other work it has, up to the present time, been almost neglected.

Because of the great cost involved, the progress of detailed surveys in southeastern Alaska must of necessity be rather slow; but it will be possible within the course of a few seasons to complete the reconnaissance mapping. This, in conjunction with a preliminary study of the occurrence and association of the ore-bearing horizons, should yield results of value to the prospectors.

The heavy capital which is being invested in the oil fields on the Pacific coast of Alaska singles this out also as a region needing further attention. Hand in hand can go a study of the coal fields of this district, which give promise of large commercial importance.

The above suggestions do not by any means exhaust the possibilities for effective geologic and topographic work, but will indicate the lines along which there is the most pressing demand.

GEOGRAPHICAL RECORD.

AMERICAN GEOGRAPHICAL SOCIETY.

Transactions of the Society, November–December, 1904.—A Regular Meeting of the Society was held at Mendelssohn Hall, No. 119 West Fortieth Street, on Tuesday, November 22, 1904, at 8.30 o'clock P.M.

President Peary in the chair.

The following persons, recommended by the Council, were elected Fellows:

P. J. Goodhart.
George A. Plimpton.
Mrs. Roswell D. Hitchcock.
Grant Squires.
Frank Benedict Cleland.
Mort J. Kaufman.
John D. W. Sterry.
John F. Doyle.
Sidney Bradford.
H. C. Chatfield-Taylor.
George S. Brewster.
Francis J. Arend.
George Coe Graves.
Samuel M. Bain.
William T. Gade.
Robert Garrett.
Carl A. Hansman.
A. G. Baker.
Otto Quelle.
F. W. Bruggerhof.
Basil H. Soulsby.
Andrew Carnegie.
William L. Brown.
Ernest W. Bowditch.
Daniel Moreau Barringer.
Gen. Francis Fessenden.
Alfred G. Hoe.
C. Heurich.
Durbin Horne.
William Gammell.
Bernard G. Gunther.
Charles J. Glidden.
C. F. Adae.
Anthony Dey.
Charles W. Iden.

The President expressed his gratification at the number of new Fellows elected, and hoped that all would lend their aid to add new names to the list.

Mr. Oscar T. Crosby was then introduced and addressed the Society on his journey in Turkestan and a Corner of Tibet.

Stereopticon views were shown.

On motion, the Society adjourned.

A Regular Meeting of the Society was held at Mendelssohn Hall, No. 119 West Fortieth Street, on Tuesday, December 20, 1904, at 8.30 o'clock P.M.

President Peary in the chair.

The following persons, recommended by the Council, were elected Fellows:

Glen E. Balch.
Alfred Crane.
Andrew F. Derr.
Horace M. Bellows.
Selmar Hess.
Mrs. Frederick F. Thompson.
Arthur C. Bradley.
George Herbert Beaman.
Arthur B. Emmons.
Dr. Herman Knapp.
James Roosevelt Lathrop.
George A. Strong.
Henry Spencer Blackmore.
Emil S. Levi.
E. A. Hitchcock.
Henry Stockbridge.
E. T. Bragaw.
Stephen Bonsal.
Anson Phelps Stokes.
S. M. Dix.
Joseph Holland.
W. Nephew King.
F. Robert Mager.
A. L. A. Himmelwright.
William E. Chancellor.
W. B. Lawrence.
J. H. Mergentine.
Joseph G. Myers.
Charles C. Mellor.
Charles E. Sampson.
Temple Bowdoin.
S. Bookman.
Louis Haupt.
Henry B. Bigelow.
John B. Jackson.
William Travers Gray.
Henry Cabot Lodge.
G. M. Laughlin.
Horace H. Fritz.
Clement Brown.
Alfred H. Brooks.
Thomas M. Carnegie.
John Bassett Moore.
Mrs. Charles C. Beaman.
John B. Marcou.
Robert N. Kenyon.
Hyman Starr.
Dwight Braman.
Robert G. Eccles.
Arthur M. Edwards.
Charles Henry Fish.
Frederick G. Agens.
William T. Meredith.
J. Jungmann.
Louis V. Holzmaister.

The President then introduced Mr. Alfred H. Brooks, who addressed the Society on the Geography and Resources of Alaska.

Stereopticon views were shown.

On motion, the Society adjourned.

THE FIFTIETH ANNIVERSARY of the Incorporation of the Society was commemorated by a dinner at Delmonico's restaurant on the 21st of December, 1904.

The proceedings at the dinner are recorded in this BULLETIN, pp. 22–26.

AMERICA.

The Association of American Geographers.—This Association was organized at a meeting in Philadelphia on Thursday, Dec. 29. The meeting was held in the University of Pennsylvania. The constitution adopted specifies as the objects of the Association,

the cultivation of the scientific study of geography in all its branches, especially by promoting acquaintance, intercourse and discussion among its members, by encouraging and aiding geographical exploration and research, by assisting the publication of geographical essays, by developing better conditions for the study of geography in schools, colleges, and universities, and by co-operating with other Societies in the development of an intelligent interest in geography among the people of North America.

The membership is limited to persons who have done original work in some branch of geography. The following officers were elected for the first year:

President, W. M. Davis; Vice-Presidents, G. K. Gilbert and A. Heilprin; Secretary and Treasurer, A. P. Brigham; Councillors, Cyrus C. Adams, H. C. Cowles and R. S. Tarr.

After the organization was completed, about twenty papers were read by members, including W. M. Davis, A. P. Brigham, Bailey Willis, R. S. Tarr, R. E. Dodge, E. Huntington, H. C. Cowles and others.

The Association starts with a membership of about fifty working geographers of North America. The departments of physiography, exploration, meteorology, oceanography, biology (including zoological distribution and anthropogeography), and educational and historical geography are thus far included. It is not intended that the Association shall merely add another to the list of geographical societies; it is believed that the geographers of North America, through such an organization as this, which will facilitate their acquaintance and intercourse and thus make mutual co-operation more convenient and feasible, should become a very helpful influence in behalf of the geographical interests of the continent. Practical efforts looking towards the provision of more accurate and effective "Helps for Teachers of Geography," the improvement of map-making and other phases of work, were suggested. A programme on these lines of effort will require hard work, but there is no doubt that the Association will be very useful and successful if it is able to stimulate interest and to organize effort in behalf of a better understanding of geography among the people of the continent.

Glacial and Post-Glacial History of the Hudson-Champlain Valleys.—In recent numbers of the *Journal of Geology* (Vol. XII, 1904, pp. 415–469 and 617–660), Prof. C. E. Peet presents a detailed statement of observation and interpretations relating to the glacial and immediately post-glacial history of the Hudson-Champlain valleys. Many local features are described and their interpretation discussed. These features include the several moraines, kame areas, deltas, lake clays, and marine deposits. It is a large area and a large subject and much painstaking work will be needed all the way from New York City to the St. Lawrence before its detailed history can be satisfactorily worked out. This is the first elaborate attempt at a broad discussion of the general features; and, considering the size and intricacy of the problem, Prof. Peet has done an exceedingly creditable piece of work. It abounds in local details to such an extent that it does not seem wise to attempt an abstract, but merely to call attention to the existence of the paper. R. S. T.

Descriptions of Maryland.—The Johns Hopkins University Studies (series XXII, No. 11–12) gather together brief descriptions of Maryland, found in the works

of travellers and in guide books, with references to a chronological bibliography of these sources filling 58 pages. An index of authors concludes the work. No claim for completeness is made for the list of books, but it should prove useful to those interested in the State's history and to students of local conditions, manners, and customs.

U. S. NAVAL WIRELESS TELEGRAPH SERVICE.—The Pilot Chart of the North Atlantic for December announces that the facilities of the naval coastwise wireless telegraph stations, where not in competition with private wireless stations, are placed at the service of the public, and particularly of maritime interests, for the purpose of reporting vessels, maritime casualties, and derelicts at sea, for receiving private or commercial telegrams from ships at sea for further transmission by wire, and for sending wireless telegrams to ships at sea. For the present this service will be rendered free, but all messages will be subject to the tariffs of the ship stations and land lines. The Government now has 11 wireless stations on the Atlantic coast, 2 on the Pacific coast, and stations also at San Juan, Porto Rico, and Culebra, W. I. It is expected in a few weeks to have 4 more stations on the Atlantic coast, 1 on the Pacific coast, 2 in Porto Rico, 1 at Guantanamo, Cuba, and 1 in the Panama Canal zone.

SNOW AND RAILROADS IN THE SIERRA NEVADA.—In the BULLETIN for June, 1903, pp. 269–270, mention was made of the climatic difficulties met with in the construction and operation of railroads in different parts of the world. As a supplement to those notes, reference may here be made to a recent article in the *Scientific American*, in which emphasis is laid on the great hindrance to railroad operation resulting from the deep winter snows in the Sierra Nevada Mountains and to the various devices by which human ingenuity has endeavoured to overcome the obstacles which nature has put in man's way.

The snowsheds on the Central Pacific Railroad were first built with steel roofs, and in sections, somewhat similar to those of an ordinary house, but it was found that the unbalanced weight of the snow on one side or the other caused continual trouble by throwing the sheds out of line downhill. The sheds were next anchored back to the side of the hill with heavy rods attached to the framework of the shed, and secured to the rock or earth of the cut. It was then found that the snow melted from beneath the rods, and on the adjacent ground and roof of the shed, so that the entire mass for many feet in depth would hang upon the rods, bending them down, and pulling the sheds toward the bank, throwing them out of line in a direction opposite to that which occurred when there were no rods. A further development was the extension of the roof, where practicable, into the adjacent banks, forming a shed which prevented the wedge of snow from piling in between the building and the bank. The success of this form of shed suggested the present typical shape, which has a flat roof, the top of the shed being somewhat wider than the bottom, so that the melting wedge of snow falls away from the side of the shed instead of pressing against it, and so that the weight upon the base is increased, to prevent overturning. This form of roof naturally came closer to the stacks of the engines and increased the liability from fire in the dry season. Deflectors are therefore attached to the smokestack, and these throw the sparks to the sides, instead of straight up against the roof.

On the Central Pacific Railroad there are thirty miles of continuous snowsheds which, with others in isolated spots, bring the total up to about thirty-three miles. Near the summit of the Sierra Nevada, in addition to snowdrifts, there are avalanches containing rocks, trees, etc., which are carried along with the sliding snow. Against

these the snowplough is of no avail, and it therefore seems impracticable to dispense with the snowsheds in this section of the country, in which the snow lies upon the ground in some years from November till June. The stretch of road subject to such conditions covers a distance of thirty-three miles, lying about equally on each side of a station at the summit of the Sierra Nevada Mountains on the Central Pacific Railroad. To guard against fires, a system of watchmen, connected with one another and with various intermediate points by telephone, and an alarm signal system, have been devised. Watchmen are stationed day and night at seven lookout stations. From one of these nearly the entire line of sheds is visible. Three fire trains (and a fourth during the driest part of the summer) always have steam up and crews at hand. Each train consists of a locomotive, fire-fighting brigade, and water cars, which can reach any point within a very few minutes and extinguish a fire without much difficulty. During a recent summer, the total loss through fire was not over $100; but occasionally the fire gets under way and destroys some miles of shed before it can be stopped. In such cases, the only effectual way to stop a fire is to tear down a gap of from fifty to one hundred feet in length. This prevents the remainder of the shed from acting as a chimney and drawing the flame along, as it does when uninterrupted, with great velocity, the heat being so intense that it destroys not only the rails, but the ties buried in the ballast.

The recurrence of these fires, with the resulting loss of property and delay to traffic, suggested the idea, on the Southern Pacific Railroad, of having gaps at intervals along the line which can be closed before the winter storms set in. The gaps or telescopic sheds consist of sections 50 feet long, and sometimes two sections 50 feet long, of movable sheds running on wheels on a track having a gauge of 16 feet 8 inches, the roads being supported on sills outside the ballast line of the main track. These telescoping pieces are arranged to run inside a section at one or both ends of the gap, built larger for that purpose. During the winter, the sections are closed, and the shed is then continuous and of practically the usual construction. As soon as the snow has ceased falling for the winter, the braces are removed and the telescopic shed is slid into the adjacent large section. These movable or telescopic sheds are intended to be placed at distances of from 2,000 feet to a half-mile apart in places favourable to their location. The Southern Pacific Company now has some sixteen of these telescopic snowshed sections, and so far they have proved successful in stopping the progress of large fires. R. DEC. W.

MOUNTAIN BREEZES IN KERN COUNTY, CALIFORNIA.—In the October issue of *Climate and Crops: California Section*, the voluntary observer at Isabella, in Kern County, Southern California, notes the occurrence of descending mountain winds at night, and the effect of these winds upon vegetation. A rapid descent of air, as in the *foehn* or *chinook*, usually brings a rise of temperature, and this is also the case with winds which blow with considerable velocity down mountain sides and valley bottoms at night. On the other hand, if such currents descend slowly, they are cooled by radiation and conduction to the cold ground more than they are warmed adiabatically. Hence they come down as cool breezes. In the case referred to in California, it is obvious that the descent is rapid, for the account says that these winds have "sufficient force to give a temperature in clear weather during winter 11° warmer" at Isabella than at a neighbouring station, Visalia. The observer notes that he has a vine on his porch which has remained green summer and winter for many years, but that the descending wind fails to reach Visalia, and from there on to Tulare Lake there are heavy frosts in winter. R. DEC. W.

More Men than Women.—The proportion of the sexes in the United States is discussed in Bulletin 14 of the Bureau of the Census. It says that in the continental United States there are 1,638,321 more males than females, or about 2 in every 100 persons. The relative excess of males here is greater than the average for all countries. Europe has an excess of females. Every other continent, so far as known, had an excess of males. Probably in the whole world, and certainly in that half of it which has been counted, with distinction of sex, there are several million more males than females. As a rule, sparsely-settled regions have an excess of males and densely-settled regions an excess of females. American cities as a rule have more females than males. In the 1861 cities, each having in 1900 at least 2,500 inhabitants, there were 201,959 more females than males, although many Western cities contain more males than females. The fact that the cities of the eastern United States and western Europe have an excess of females is due mainly to the greater opportunity for women to find employment in those cities. Notwithstanding the great excess of males in the total population of the United States, there are two periods of life when the reported number of females is greater. One, extending from about 83 years of age to the end of life, is probably due mainly to the longer average life of women ; the other, from 16 to 25, is perhaps apparent rather than real, and due mainly to the greater number of women who claim erroneously to belong to this age.

The Sierra Madre, Mexico.—Dr. O. C. Farrington prints in the Field Columbian Museum Publication No. 89, 1904, some interesting observations made in the Sierra Madre, west of Durango, in 1896. The region, though possessing a climate which is not especially unfavourable, is so rugged in topography that it is practically uninhabited. Although seven railroads have western terminals north of the Isthmus of Tehuantepec, not one has crossed the Sierra Madre to the west coast. Of course the topographic barriers are not so great as absolutely to prevent railroad construction, but added to the ruggedness is the fact that absence of good harbours and the very narrow strip of low land along the west coast do not invite the building of roads. That the unfavourable condition affected savage as well as civilized man is indicated by the fact that Lumholtz has searched unsuccessfully for traces of a former population in this region. It contains some resources, especially forests and minerals, but the exact extent of the latter is as yet unknown because of lack of exploration.

Farrington describes the Cerro de Mercado, or Iron Mountain, at Durango, and gives some interesting points regarding the geology and physiography of the section traversed. One of the most striking topographic features observed was the Ciudad de Rocas, or City of Rocks, a peculiar erosional form resembling the erosion in the Bad Lands. Instead, however, of pinnacles, peaks, ridges, and angular outlines, the sculptured rocks were domed and rounded. There is a marked absence of joint planes in the homogeneous rhyolite and almost no talus at the base of the domes, so that the forms are wholly those of rock sculpturing in rock of remarkably uniform texture. There are occasional other horizontal beds of weaker rock, whose more rapid weathering introduces some irregularity into the general dome structure.

R. S. T.

AFRICA,

Progress in the Anglo-Egyptian Sudan.—Not five years have elapsed since the Mahdist rule in the Egyptian Sudan was overthrown and the rebuilding of Khartum, the old capital, was taken in hand. Its site was then only a labyrinth

of tumbled ruins, of mud houses and huts. The London *Times* reports that great progress has been made in rebuilding the city. Practically the whole river front is now occupied by buildings. The large palace is the central feature, and near it are the spacious Government offices. Along the river front are workshops, a hospital, a fine hotel, residences standing in pretty gardens, the Gordon College, and the cool and comfortable barracks of the British regiment. It was thought at one time that the native population of Omdurman, the capital of the Mahdists, would follow the official class across the river to Khartum. There are now about 50,000 of them in Omdurman, but they are very happy where they are, and it is realized that it is better for them to remain in their present home.

The building of a railroad to connect Khartum with the Red Sea has begun from both ends. About thirty miles of track have been laid from the Atbara River, and work is in full swing from the Red Sea port of Suakin. The distance by steam transport between the Mediterranean and Khartum is 1,500 miles, of which 1,300 miles are by rail and 200 by water. When the railroad is finished between Suakin and the confluence of the Atbara with the Nile, 470 miles of steam routes will connect Khartum with the sea. This will greatly reduce the cost of transportation between the Mediterranean and Khartum and the Upper Nile.

Eritrea's New Capital.—The Government offices of the Italian colony of Eritrea have long been centred at Massowa on the Red Sea. They are now to be removed to the high plateau of the hinterland on account of the very trying climatic conditions at Massowa. The Government has adopted the suggestion of Mr. Ferdinand Martini, Governor of the colony since 1897, to transfer the capital to Asmara, sixty miles in the interior and forty-two miles from Macatat, the present inland terminus of the railroad. In 1897, when the Italians first occupied Asmara, it contained only a few scores of huts and an Abyssinian fort. The town now has a population of 9,000, including about 1,000 Europeans, all Italians excepting a few Greeks and some Norwegian missionaries. It has some aspects of European towns, with a few superior dwellings, cafés, a theatre, a casino, a hotel, a post office, and handsome public and private gardens. It is situated only a mile and a half from the edge of the plateau, is in the midst of splendid pastures, and around it flourish many varieties of trees and some European crops.

None of the typical tropical diseases has a foothold in Asmara, which is 7,800 feet above the sea, with a maximum temperature of 88° F., and a minimum of about 14°. The town is reached from the end of the railroad by a remarkable wagon road built by the Italians in 1900–01. The road is 42 miles long, winds from terrace to terrace, through deep cuts and numerous tunnels, is wide enough for wagons to pass one another, and is rendered safe at its outer edge by a barrier of timbers. Stages run over the road, the fare to Asmara being $5. Italy expects ultimately to extend the railroad to Asmara, but, as the cost will be enormous, the enterprise may not be carried out for years.—(*À Travers Le Monde*, Nov. 26, 1904.)

Aïn Sefra Destroyed by a Flood.—The *Bulletin* of the Comité de L'Afrique Française (No. 11, 1904), says that on Oct. 21 the village of Aïn Sefra, in southern Algeria on the edge of the Sahara, was suddenly overwhelmed by torrents which swept down two wadys. The flood was due to heavy rain that had fallen on the slope of a neighbouring mountain range. The inhabitants had no time to escape the rush of waters. Ten Europeans and fifteen natives were drowned in spite of the heroic efforts of the officers and soldiers of the garrison to save life. Among the

victims was Mrs. Isabelle Eberhardt, a writer of reputation, who was collecting material for a work concerning family life among the Mohammedans. It is surprising that the loss of life was not greater, for only about a dozen of the 200 or 300 houses in the village remained. The flood subsided in about ten minutes after reaching the town.

This disaster recalls another of the same kind which occurred in the Algerian Sahara on the evening of April 12, 1899, near Berrian, 300 miles south of the City of Algiers. A force of 90 French soldiers had camped in the usually dry bed of the Wady Urirlu. The stony bed of the Wady is depressed only a few inches below the flat surface of the region. A cloud-burst occurred among the hills to the west, and a few minutes after an alarm was raised an area about three-fifths of a mile across was under six feet of water. Most of the soldiers reached neighbouring hillocks, but the bodies of six of them were found next day several miles below the spot where camp had been pitched.—(BULLETIN, 1899, p. 375.)

These catastrophes show that although rains are comparatively rare in the Sahara, local storms with heavy precipitation sometimes occur, causing floods that bring disaster.

NEW AFRICAN EXPEDITION.—Major Powell Cotton left London for Khartum in November for another expedition in Africa. The object of the journey, which it is expected will occupy about eighteen months, is the exploration of the vast region lying between the Nile and the Zambezi. The expedition will go up the White Nile to Lado, and then strike south through the East side of the great forest, probably visiting the western slopes of Ruwenzori. After investigating the forest and the district to the west of Lake Kivu, the region to the west of Tanganyika will be traversed, and the expedition will then proceed south toward Katanga. Eventually, Major Cotton hopes to come out in British territory in Nyasaland, whence he will travel to the coast by the Zambezi. Every facility will be given to Major Cotton by the Belgian Government, and he will traverse the entire length of the Congo State. Among the special objects of the expedition are the study of the great mammals of the forest region, and also the native tribes, especially the pygmies. A considerable part of the region to be traversed is quite unknown, so it may be hoped that the expedition will make additions to geographical knowledge.

FOUREAU'S MAP OF HIS TRANS-SAHARAN JOURNEY.—The Foureau-Lamy expedition between Algeria and the Congo, in 1898–1900, was the largest scientific party that has crossed the Sahara. Since his return to France, Mr. Foureau has been collating the geographical material he collected, and has produced a fine map, in 16 sheets, which has now been published by the Société de Géographie in the form of an atlas. Twelve sheets, showing the itinerary of the mission from Wargla in the Algerian Sahara to Bangui in the French Congo, on the Ubangi river, are on the scale of 1:400,000, or 6.3 statute miles to an inch. The remaining four sheets are given to a detailed survey of the course at low water of the Shari, between Fort Lamy and Fort Archambault, on a scale of 1:100,000, or 1.5 statute miles to an inch. As all the surveys of this expedition were made with the best instruments and by the most scientific methods, the map gives an accurate idea of the topography along the entire route. The projection adopted was the modified Flamsteed, the central meridian being 10° east of Paris, which nearly coincides with the mean axis of the itinerary. In the margin of each sheet are insets and plans of the most interesting points. This map will be one of the bases for the construction of a detailed map of the Sahara, materials for which the French are now collecting.

FULANI RULERS IN NORTHERN NIGERIA.—Since the occupancy of Sokoto and Kano by the British, the newspapers have frequently spoken of "the downfall of Fulani rule." Major J. A. Burdon, Resident of the Sokoto Province, says in the *Geographical Journal* (Dec. 1904) that though this is true, inasmuch as the Fulani Emirs now have to acknowledge a superior, the expression is misleading. The Fulani Emirs still rule, collect taxes and administer justice. The people have to obey their old rulers, and therefore it cannot be said that the Emirates have fallen. What has happened is that a Suzerain power now guides the rulers, and above them is a supreme court of appeal. The Fulani States, therefore, have not ceased to exist, but have become self-governed portions of a great empire. The feeling of many of the population is one of gratitude, because the peace established by the British has enabled them to return to their long desolate homes, and has freed traders from pillage and extortion. This feeling pervades individuals and individual communities, and will increase till it permeates the whole country. No doubt, however, there is still among many an underlying feeling of resentment. The aim of the British administration is to rule through the existing chiefs and to enlist them on their side in the work of progress and good government.

TRAVEL IN LIBERIA.—The October number of the Monthly Consular Reports contains interesting material on Liberia. Minister Lyon at Monrovia says that beside there being no railroads to further travel, there are no roads for vehicles of any kind, leading into the interior. Beasts for transport are very rare. Human porters are the most serviceable, even for human freight. The traveller is swung in a hammock suspended from a horizontal bar laid across the shoulders of two natives, who rush at break-neck speed through narrow, uneven paths, over dangerous ravines and huge logs which block the way. Except the soldiers and the traders, the coast Liberians are absolutely ignorant of their country. Roads are crooked and even labyrinthine, made so to mislead the enemy in tribal wars. A native never clears paths. If trees fall across them he goes around or climbs over. Bridges are almost unknown, because the natives prefer to swim the streams. Even the more important inland commercial centres are only approached over such roads. It seems strange that neither the State nor foreign enterprise is building roads, to lay the foundations for Liberia's commercial development and secure the perpetuation of her independence. On account of the lack of roads to the coast, the trade is being drawn off northward through French territory. Besides the ordinary climatic and physiographic difficulties in the way of these improvements, the natives themselves are often engaged in inter-tribal warfare, and they object to having roads built to their towns, because a road opens the way for attack.

Minister Lyon also discusses the natives—the Kroomen, the civilized coast negroes, and the barbarians of the interior. He notes their occupations—agriculture, grazing, lumbering and mining, and their resources—good soils, excellent tropical climate, extensive forests, numerous native plants of value, and a considerable variety of minerals. He considers currency, exports, imports, elements of trade and banking; then points out opportunities for growth of trade and obstacles in the way, including laws and regulations. He comes to the conclusion that Liberia is a country of notable natural resources in many lines, and that the greatest obstacles to her development are internal. More complete control of the natives, more stable government, and insured protection, modification of laws relating to foreign occupation, industry and labor, and the making of roads are among the present positive demands for the substructure of national development. G. D. H.

Oscillations in the Level of Victoria Nyanza.—As in all inland bodies of water the level of Victoria Nyanza varies from time to time with more or less regularity. Capt. H. G. Lyons, director of the General Survey Department of Egypt, has just reported the facts thus far ascertained ("On the Variations of Level of Lake Victoria," Cairo, 1904). The annual oscillation of the lake level varies between 1 and 3 feet, while the absolute range during the last seven years has been 3 feet 9 inches.

The Census of British South Africa.—The results of the census of the various South African Colonies carried out early this year have been presented to Parliament. The general totals for the respective colonies and protectorates are as follows:

	WHITES.	COLOURED.	TOTAL.
Cape Colony	580,380	1,825,172	2,405,552
Transvaal and Swaziland	300,225	1,053,975	1,354,200
Orange River Colony	143,419	241,626	385,045
Southern Rhodesia	12,623	—	—
Natal	97,109	187,582*	284,691*

* Exclusive of native areas.

ASIA.

Expedition to Inner Asia.—Mr. Robert L. Barrett has planned an expedition to Central Asia which will occupy about two years. He will defray the entire cost of the enterprise, and Mr. Ellsworth Huntington, already known for his remarkable journey through the great cañon of the Euphrates River and his geographical work in Persia, will share his labours. They expect to reach India about the end of February. From Bombay they will go directly north to Kashmir, where they expect to spend two or three months in studying the southern tribes of the Himalayas, giving special attention to evidences of recent glaciation, or other climatic changes. As soon as possible they will enter the high mountains, crossing the Indus at Leh, and entering the great plateau of western Tibet. After gaining some idea of its structure, they will descend into Chinese Turkistan on the north, and will spend there the remainder of the season of 1905.

The chief points of study will be the history of the basins of Central Asia during recent geologic times, and the changes which have taken place since the occupation of the country by man.

During the winter of 1905–6 the explorers will live for two or three months in Kashgar, and expect then to travel along the northern border of Chinese Turkistan to the Turfan depression, Lop Nor, and Kuku Nor. Thence they will proceed southward to the sea, if time allows and circumstances permit; otherwise they will travel east through China to Peking.

In addition to physiographic studies, in which Mr. Barrett is chiefly interested, Mr. Huntington will undertake investigations of the relation of physiography to life, and especially to human life and history. The expedition is under the auspices of the Association of American Geographers.

AUSTRALIA.

Newspaper Weather Map in Australia.—It has for some time been the practice of a few daily newspapers in Europe and in the United States to print reduced copies of the daily weather maps. This practice, which is an excellent one,

brings before a large number of persons the most important facts shown on the full-size chart, but so far few newspapers have been willing to give up the space needed for the map. It is encouraging to receive a copy of the Sydney (New South Wales) *Daily Telegraph* of October 12, 1904, which contains the first daily weather map ever published in an Australian newspaper. The map shows isobars, winds and rainfall; is prepared from information furnished by Mr. H. A. Hunt, Acting Meteorologist of the State, and is to be published daily at the request of many correspondents of the paper, especially of many school teachers. Meteorology has recently been incorporated into the school course in New South Wales. R. DeC. W.

EUROPE.

A Biological Station on the Murman Coast.—The *Zeitschrift* of the Berlin Geographical Society (No. 8, 1904) says that a biological station has been established on the Murman coast, the northern shore of the large Kola Peninsula. The station is not far from the port of Alexandrovsk. The purpose is to study all the conditions of the Arctic Ocean in that neighbourhood, and especially its forms of life. A sailing vessel connected with the station is fitted with the best appliances for making collections of sea life. A large aquarium has also been provided for the purpose of studying marine animals that can be kept alive in it. The research work, last summer, resulted in a very large and rich variety of material for study. An enormous number of specimens were dredged from the sea floor, among which were many interesting forms of crustacea, medusæ, sea anemones, and others forms of life.

Fogs in London.—At the November meeting of the Royal Meteorological Society, in London, Mr. F. J. Brodie, who has of late years given special attention to the study of London fogs, read a paper on the *Decrease of Fog in London during Recent Years.* Mr. Brodie has tabulated the number of days with fog reported at Brixton, the London station of the Meteorological Office, for the 33 years 1871–1903, and found that the mean annual number of fog days was 55, of which 45 occurred in the winter half-year and only 10 in the summer half-year. December was the foggiest month, with 9.5 days; the next being November, with 8.5; January, with 8.2, and October, with 7.8. The clearest months were July, with 0.4; June, with 0.6, and May, with 0.8. The greatest number of foggy days was 86, in 1886, and 83, in 1887; and the least was 13, in 1900, and 26, in 1903. Dividing the 33 years into three periods of 11 years each, the author showed that the mean for 1871–1881 was 55; for 1882–1892 it was 69, while for 1893–1903 it was only 41. There seems, therefore, to have been a very marked decrease in the number of days with fog during the last 11 years. R. DeC. W.

The Value of Accurate Rainfall Records.—The following quotation from the London *Daily Mail* for November 30th last illustrates the value of accurate rainfall data in the affairs of everyday life. The paragraph is headed *Dispute about a Rainfall:*

> The question of rainfall at Paignton last Whit-Monday was the cause of a dispute which was decided at Totnes County Court yesterday, when the committee which arranged the Paignton gala and sports sued an insurance company for £36 15s. They effected an insurance with Lloyd's, the understanding being that if more than .08 in. of rain fell between nine in the morning and four o'clock in the afternoon they would receive the difference between the gate receipts and £100. The plaintiff, who took the gauge with a pencil and an ordinary rule, measured an eighth of an inch. The defendants doubted the possibility of such a heavy fall, as at Torquay, two miles away, only a hundredth of an inch was recorded. The jury gave a verdict for the plaintiffs, and the Judge said that although the committee had adopted antiquated methods, the defendants made no effort to take the gauge themselves.

R. DeC. W.

ARCTIC.

AMUNDSEN'S NORTH MAGNETIC POLE EXPEDITION.—The Norwegian Expedition which started for the region of the north magnetic pole early in the summer of 1903 left a letter, dated Aug. 27, 1903, on Beechey Island (or rather peninsula), which was found in October last by the crew of the American whaler *Vesuvius*. The letter said that the expedition would pass its first winter on the way to the magnetic pole somewhere in Lancaster Sound, and the second winter (1904–05) in Peel Sound, as near as possible to the magnetic pole. Peel Sound, the narrow strait which sepaates North Somerset from Prince of Wales Land, was visited by J. C. Ross, Penny, and Austin (1849–51) during the Franklin search.

ECONOMIC GEOGRAPHY.

COMMERCIAL CHINA IN 1904.—During the past year the Bureau of Statistics in the Department of Commerce and Labor brought out monographs on China, Korea, Russia, and Japan. The information is taken from the Monthly Summary of Commerce and Finance for January and for February, 1904.

In the paper devoted to China a coloured map shows the political divisions, railways, constructed and projected, the internal waterways, telegraphs and cable lines and some of the ocean trade routes ; also the ports of foreign control and the Treaty ports. The map does not show as many Treaty ports as the text, and both are a few ports behind the real number. The map gives 32, while the statistical table gives 33. The discussion of the Treaty ports in the text is clear and instructive. That of waterways and internal communications is full of information. The paragraphs on industries show the fact and the causes of the rapid development of manufacturing in China. The currency occupies over twenty paragraphs. Statistics cf commerce, shipping, growth of trade, population, etc., occupy about one-third of the 110 quarto pages. China's awakening is made apparent to the reader ; when the projected railroads are in operation it will be felt in China. G. D. H.

COMMERCIAL KOREA IN 1904.—Two maps of Korea and vicinity introduce the monograph, but are unsatisfactory. The course of the proposed railroad across the Empire, both north and south and east and west, with its finished section from the port to the capital, is shown; but the shore-line, a few towns and the streams are all of the geographic features which appear. The Treaty ports are eight in number, two or three of which are on the proposed railroad, and thus will be in steam com munication with the Siberian road at the mouth of the Yalu River. The south end of the road at Fusan is at the nearest point to Japan. Owing to the mountainous topography and short, steep courses of the streams, water transportation is very poor. Road-making has received no attention in Korea. The commercial possibilities of the Yalu are discussed. Korea's exports are raw materials, such as minerals, grains, cattle, and some products of the sea. The food of the people and their occupations receive treatment. Tables give the analysis of the commerce, its chief items, amounts, and participants. G. D. H.

COMMERCIAL RUSSIA IN 1904.—While all eyes are turned to the war in the Far East the business world finds the war only an episode in the evolution of commercial life and relations in the Orient. The strides made by Russia in ten years in currency and banking regulations, railway construction, manufacturing other than in the village homes, and the uncovering of mineral wealth, are described and partially

explained in the monograph. The Siberian railway, shown on a large map of trade routes, is discussed in its many phases of usefulness. Among the conclusions are the following:

(*a*) The Siberian railway facilitates Siberian immigration, and a more rapid improvement of the great agricultural possibilities of the land traversed.

(*b*) Affords an outlet, both West and East, for the agricultural products, lumber, furs and mineral products.

(*c*) Will serve as a directive line for the industrial expansion of Russia already begun.

(*d*) Shortens the distance along Russia's great Siberian arm to her Eastern finger-tips by many weeks of travel, thus unifying the great, unwieldy, extended Empire.

(*e*) Forms a connecting link in the world's Northern commercial girdle. Of course Russia is to profit immensely by her position on this monopolizing trade route.

The agricultural condition, possibilities and outlook are discussed; many other industries, as furring, lumbering, commerce, and animal husbandry, are similarly treated. Notes and tables of special interest to manufacturers, merchants and commercial men are common, while statistics of the various industries, exports, imports, customs and transport tariffs, population, cities and finance make a valuable compendium. G. D. H.

COMMERCIAL JAPAN IN 1904.—Japan and its relation to the territory bordering on the Pacific Ocean is the title of the map. Comparison of this with a good physical map of the Empire brings out the geographic reasons for the distribution of tea and rice-growing. The next treatment is semi-historical, beginning with a brief statement of the earlier commercial relations and then taking up the present conditions. Japan's reliance upon the United States for certain commodities, notably cotton, illuminating oil and iron and steel, is shown to be mainly due to geographic conditions, while her exports to America, especially silk, tea, matting, bamboo and lacquered ware, are commodities which we are unable to produce. A trade thus based on geographic differences must be fairly enduring and mutually beneficial.

Foreigners in Japan, to the number of 11,684, are mostly classed as merchants and men of other professions. Of the Japanese in other lands 72 per cent., or 90,146, reside in the United States, and about 30,000 more are in Oriental lands, Korea, China, Russian and English colonies. Thus a very small per cent. of the Japanese with foreign residence are in Western countries other than the United States. Both the export and import business of Japan are conducted largely by resident foreigners. A good article, treating of the effects of Japan's commercial development on her civilization, and prepared by a Japanese student in America, will be read with interest. The monograph discusses the more important trades and industries as to their present condition and prospects. Elaborate statistical tables of actual conditions and comparative growth in production and commerce constitute at least one-third of the publication. G. D. H.

OCEANOGRAPHY.

BULLETIN OF THE OCEANOGRAPHICAL MUSEUM OF MONACO.—The Prince of Monaco has begun the publication of a *Bulletin* as the special organ of the Oceanographical Museum which he has founded at Monaco. It will print the results of special investigations conducted at the Museum, of research expeditions carried out by the Prince, and general papers relating to oceanography. It will not appear regularly, but will be published whenever a memoir is prepared, each number having its own pagination. The language is French, with an occasional summary in Esperanto, the

artificial tongue whose acceptance both as an international and scientific language its friends are now urging. It remains to be seen how far the initiative of the Prince will promote this effort. Nineteen numbers of the *Bulletin* were printed between January 1 and October 15 last year.

THE GUINEA CURRENT.—In 1895 the Royal Meteorological Institute of the Netherlands published an atlas under the title of "De Guinea en Equatoriaal Stroomen" (The Guinea and Equatorial Currents) in which were recorded the meteorological and oceanographic observations made by the Dutch in the domain of these currents from 1855 to 1890. A second edition has just been issued extending the results of these observations to 1900 and augmenting the area studied by 3° of latitude and 13° of longitude. A supplementary volume contains explanatory text and tables giving the mean monthly rate of current, force and direction of wind, and also the temperature, barometric pressure, and other data for each area whose sides are meridians and parallels 1° in length. The information on the charts is very clearly expressed, and the work will be of value to the mariner as well as to the oceanographer and meteorologist.

GENERAL.

PROFESSOR PENCK'S LECTURES IN THIS COUNTRY.—Professor Albrecht Penck, before returning to his duties in the University of Vienna, gave a course of lectures at the Lowell Institute, Boston, on "Selected Chapters in Physiography." This course was followed, in the latter part of November, by three lectures before the Harvard Geological Conference on the "Alps in the Great Ice Age." The first lecture related to Climatic Variations of the Ice Age, the second to Glacial Sculpture of the Alps, and the third to Man and the Ice Age. The chief results reported in the monograph "Die Alpen in Eiszeitalter," which Professors Penck and Brückner have written, were presented in these lectures. Just before sailing Prof. Penck gave a very interesting lecture before the section of Geology and Mineralogy of the New York Academy of Sciences, on December 2, on "The Surface Features of the Alps."

GEOGRAPHY AT THE COLLEGES AND UNIVERSITIES OF THE UNITED KINGDOM.—It is a pleasure to find from the last number of the *Geographical Teacher* (London) that geography is now recognized in more than a casual way in at least thirteen of the colleges of the United Kingdom, though there are eight colleges in which the subject still has no place. The work given at the different institutions includes all phases, but embraces more regional geography and history of geography than is usually the case in American courses. Political geography also receives much attention, but there is only one course in anthropogeography, a field that is too much neglected in all college and university work. R. E. D.

LANTERN LECTURES FOR THE BRITISH COLONIES.—The London *Times* (Nov. 25) says that, with the purpose of giving school children in the British colonies a better knowledge of the United Kingdom, the Colonial Office authorized a committee to draw up a syllabus of seven lectures on the United Kingdom, each to be illustrated by forty lantern-slides. The lectures are being prepared by Mr. H. J. Mackinder, who has the general superintendence of the scheme. They are intended for the higher classes in elementary schools, or, with modification, for adults. Each lecture will supply several hours' lessons, and will be a text for teaching and a guide as to the method of teaching. These lantern lectures will be introduced first into the Colonies of Ceylon, the Straits Settlements and Hongkong. The colonies will also supply material for similar lectures upon them to be used in Great Britain.

THE JOURNAL OF GEOGRAPHY.—Beginning with the number for January, 1905, Prof. Richard Elwood Dodge, of the Teachers College, Columbia University, New York City, assumes full responsibility for the editing and publishing of the *Journal of Geography*. The *Journal* will continue in its present form and character, and will deal with geographic education in elementary, secondary, and normal schools. All communications should be addressed to the editor at the address given above.

DR. GILBERT HONORED.—Dr. G. K. Gilbert, of the U. S. Geological Survey, has been elected a foreign member of the Accademia dei Lincei at Rome.

OBITUARY.

EDWARD STANFORD.—Mr. Edward Stanford, the well-known map publisher of London, died on Nov. 3 last in his seventy-eighth year. His interest in maps was first aroused in 1848. He produced in 1862 the most perfect map of London that had ever been issued, using as a basis a skeleton map showing only main roads on a scale of 12 inches to one mile. He employed surveyors to fill in details, and as fast as sheets came in from the surveyors they were engraved with infinite pains on steel plates. He published many other notable maps.

RICHARD KUND.—Major Richard Kund, who, with Lieut.-Tappenbeck, was engaged in the exploration of the Southern Cameroons (1888–90), died on July 31 last, at the age of fifty years.

NEW MAPS.

AMERICA.

UNITED STATES.—Geologic Atlas of the United States. No. 112. Bisbee Folio, Arizona, 1904.

The Bisbee quadrangle is in Cochise Co., in the southeastern part of Arizona and within the mountain region. It extends between Longitudes 109° 45′ and 110° W. and Latitudes 31° 30′ and 31° 20′, the latter being the Mexican boundary line; area about 170 square miles. The most striking topographical feature in the map is the sharp contrast between mountain and plain. The quadrangle owes its economic importance exclusively to the occurrence within it of ores of copper. The total output of copper to the close of 1902 was 380,047,210 pounds.

UNITED STATES.—Land classification map of Little Belt Mountains Quadrangle and part of Fort Benton Quadrangle, Montana. Scale, 1:250,000, or 3.7 statute miles to an inch. U. S. Geol. Survey, Washington, D. C., 1904.

A fine specimen of the maps by which the Government is illustrating the economic resources of the forest reserves and public lands of the West. Colours differentiate the forest areas according to the quantity of timber per acre, and show the grazing, agricultural, and unproductive areas. The map accompanies Professional Paper No. 30 on "Forest Conditions" in this region.

UNITED STATES.—Lincoln Forest Reserve, New Mexico. Scale, 1:348,000, or 5.4 statute miles to an inch. U. S. Geol. Survey, Washington, D. C., 1904.

Colours classify the land according to the quantity of timber, the burned timber

tracts and the timberless or grazing lands. Topography is shown by contours with interval of 250 feet. Illustrates Professional Paper No. 33 on "Forest Conditions" in this Reserve.

UNITED STATES.—Hydrographic Map of Alabama. Scale, 1:2,534,400, or 40 statute miles to an inch. Compiled by B. M. Hall, U. S. Geol. Survey, Water Supply and Irrigation Paper No. 107. Washington, D. C., 1904.

A black map illustrating this monograph descriptive of the water-power of Alabama. The gauging stations and important water-powers utilized or undeveloped are shown, together with the Fall Line. The powers on the smaller streams are not shown.

UNITED STATES.—Reconnaissance Map of the Cascade Range near the 49th Parallel. Scale, 1:260,000, or 4 statute miles to an inch. By G. O. Smith and F. C. Calkins, U. S. Geol. Survey, *Bull.* No. 235. Washington, D. C., 1904.

This is a geological map across the Cascade Range near the boundary between the United States and Canada. Elevations are shown by contours, roads and trails are indicated, and the geological formations are represented by tints and type.

UNITED STATES.—Hypsometrische Karte des Flussgebietes des St. Lawrence Stromes. Scale, 1:8,000,000, or 126.2 statute miles to an inch. *Geog. Rundschau* Vol. XXVII, No. 2. Vienna, 1904.

A good specimen of the instructive maps issued by this publication. Four tints show elevations, the boundaries of the basin stand out, and canals are indicated, though the most important of all, the Sault and Canadian Canals, are omitted.

ALASKA.—The Porcupine Placer District. Scale, 1:506,880, or 8 statute miles to an inch. By Charles W. Wright, U. S. Geol. Survey, Washington, D. C., 1904.

ALASKA.—Economic Geology of the Porcupine Placer District. Scale, 1:300,000, or 4.7 statute miles to an inch. By C. W. Wright, U. S. Geol. Survey, Washington, D. C., 1904.

These two maps illustrate *Bulletin* No. 236, which describes the Porcupine gold field, one of the most important placer districts of Southeastern Alaska, embracing an area of about 100 square miles. Its central point is approximately in 58° 25′ N. Lat. and 136° 12′ W. Long. Placer gold was discovered here in 1898, and the output of gold averages about $460,000 a year. The second map shows the distribution of the gold-bearing gravels and mineralized areas as far as determined.

PERU.—Carta Geográfica del Norte y Oriente del Perú. Mercator Projection. Scale on the equator, about 46 statute miles to an inch. By George M. von Hassel, *Boletín* of the Geographical Society of Lima, Vol. XIII, No. 13, Lima, 1903.

This large-scale map is especially valuable for its great number of place-names, numerous heights in figures among the mountains, and the distribution of the Indian tribes east of the Cordilleras. It gives the latest information concerning boundaries and routes, and marks the limit of navigation on the rivers at low water.

PERÚ.—Provincia de Cajatambo. Scale, 1:500,000, or 7.8 statute miles to an inch. *Boletín* of the Corps of Mining Engineers of Peru, No. 10, Lima, 1904.

Shows the distribution of gold, silver and coal mines, and of ore-reduction works.

EUROPE.

DENMARK.—Fisheries of Denmark in the Baltic. No scale. Publications de Circonstance, No. 13A. Conseil Permanent International pour l'Exploration de la Mer, Copenhagen, 1904.

A series of 6 charts showing the location of the plaice, herring, salmon, eel, haddock, and pike fisheries of Denmark.

SWEDEN.—The Baltic fisheries of Sweden. No scale. Same publication as above.

Six small charts showing the position of the various Swedish fisheries in the Baltic.

ENGLAND AND WALES.—A Series of 84 Plates of Maps and Plans, with Descriptive Text illustrating the Topography, Physiography, Geology, Climate, and the Political and Commercial Features of the Country. Designed by and prepared under the direction of J. G. Bartholomew. John Bartholomew & Co., The Geographical Institute, Edinburgh.

The publication of this splendid atlas is now completed. Part XIX includes text by Dr. Hugh R. Mill descriptive of the physical features of England and Wales in relation to political and commercial development. Plate 1 is a beautiful bathy-orographical map of England and Wales on a scale of 1:1,700,000, or 27 statute miles to an inch ; seven tints show heights above and six depths below sea-level. Plate 2 is a geological map with sections showing the geology of the environs of London and the distribution of the coal measures and iron works. Part XX includes religious, social, and railroad statistics. Part XXI includes tables of industrial and commercial statistics, a Glossary showing the etymology of English and Welsh place-names, and plates giving in great detail the natural distribution of vegetation, of pasture and tilled lands, of population, manufactures, and mineral products. The remaining sheets in these three parts complete the detailed sheets of England and Wales. This great work will be of the highest value to all students, and will take its place in the front rank of cartographic products.

EUROPE.—Karte der Bevölkerungsdichtigkeit der Europäischen Staaten und ihrer Verwaltungsbezirke. Von Dr. Fr. von Juraschek. Scale, 1:20,000,000, or 315.6 statute miles to an inch. *Bulletin* of the International Institute of Statistics, Berlin, 1904.

Eleven tints showing different densities of population.

GERMANY.—Uebersichtskarte der Endmoränen Ostholsteins. Scale, 1:300,000, or 4.7 statute miles to an inch. *Mitt. der Geog. Gesellschaft und des Naturhist. Museums in Lübeck*, Second Series, No, 19, Lübeck, 1904.

Shows numerous terminal moraines arranged in parallel and curving lines and spread over eastern Holstein from near the Baltic to its southern limits.

NORTH SEA.—Surface Temperatures in the North Sea. By Dr. E. Van Everdingen and Dr. C. H. Vind. Publications de Circonstance, No. 14. Conseil Permanent International pour l'Exploration de la Mer, Copenhagen, 1904.

Twelve small charts showing lines of equal temperature in the southern part of the North Sea, based upon a large number of observations in the four months, Sept.–Dec., 1903.

AFRICA.

AFRICA.—Afrique. Chemins de Fer; Navigation à Vapeur. Natural scale, 1:17,500,000, or 276.2 statute miles to an inch. *Annales de Géographie*, Vol. 13, No. 72. Armand Colin, Paris, 1904.

Illustrates an article on the present development of railroad-building in Africa. All railroads in operation, or that were building in August, 1904, are shown. Projected lines, for the most part, are not indicated because, as a rule, their routes are not wholly determined and may be subject to much modification. The navigable parts of rivers

are clearly shown in blue, but the scale of the map is not sufficiently large to distinguish between the extent of navigation at high and at low water, and the map refers only to navigation at high water. It is seen that a considerable number of the new railroads have been built in connection with the navigable parts of waterways, the railroads being supplementary to the rivers in securing steam communications between the coasts and the far interior.

AFRICA.—Eisenbahn- und Wege-Karte von Afrika. Scale, 1:30,000,000, or 473.4 statute miles to an inch. *Geog. Rundschau*, Vol. XXVII, No. 1, Vienna, 1904.

Shows railroads now in operation, those that are being built and numerous projected lines; also the extent of inland navigation and the caravan, porterage, and ox-cart routes.

TOGO.—Scale, 1:2,000,000, or 31.56 statute miles to an inch. *Geog. Rundschau*, Vol. XXVII, No. 3, Vienna, 1904.

The scale is large enough to give the additional information recently obtained concerning the topography of Togo, the new boundaries, a large number of settlements and the railroads in operation or projected.

ASIA.

ASIA MINOR.—Karte von Kleinasien in 24 Blatt. Scale 1:400,000, or 6.3 statute miles to an inch. Von Dr. Richard Kiepert. Sheets D I Budrum, B VI Erzirum, C VI Nisibin, A VI Tirabzon, D VI Nisibin. Dietrich Reimer (Ernst Vohsen), Berlin, 1902.

This work, now far advanced, continues to justify the opinion expressed with its early sheets, that it would be the best cartographic delineation of our knowledge of Asia Minor up to this time. The place-names are especially numerous, and the large scale permits a clear definition of the topographic features as far as surveys of considerable detail have been carried out.

CHINA.—Aufnahmen im Zentralen Gebirgsland der Provinz Schantung. Scale, 1:600,000, or 9.4 statute miles to an inch. *Pet. Mitt.*, Vol. 50, No. 11, illustrating Mr. Walter Anz's journey. Justus Perthes, Gotha, 1904.

Mr. Anz shows his route, what is known of the topography, and introduces figures here and there referring to sketches on the sheet of topographic forms that are seen at the places indicated.

EAST INDIES.—Ceylon. Scale, 1:506,880, or 8 statute miles to an inch. From surveys carried out in 1896–1903. The Survey Department, Colombo, 1904.

The map contains more information than any preceding map of the island. The scale is sufficiently large to show topography with considerable detail, all the common roads, telegraph lines, railroads and stations, lighthouses, &c.

ISLAND AND OCEAN.

PACIFIC ISLAND.—Neue Aufnahmen aus der Südsee. Von M. Moisel. *Mitt. von Forschungsreisenden und Gelehrten aus den Deutsch. Schutzgebieten*, Vol. XVII, No. 4, Berlin, 1904.

The sheet contains five finely-executed maps showing the latest surveys in the German possessions in the Pacific. The southeast part of Ponape Island is shown on a scale of 1:50,000, or 0.7 statute mile to an inch; the northwest part of the Gazelle Peninsula, on a scale of 1:200,000, or 3.1 statute miles to an inch; the west portion of New Hannover, on a scale of 1:100,000, or 1.5 statute miles to an inch; the middle portion of New Mecklenburg, on a scale of 1:200,000, or 3.1 statute miles to an inch.

The regions covered by these surveys are in the little-known Bismarck Archipelago, excepting Ponape, which is one of the Caroline Islands. Luise Harbour on Lihir I. east of New Mecklenburg is shown on a scale of 1:75,000, or 1.18 statute miles to an inch. Full descriptive text accompanies the sheet, which is an important addition to the mapping of these little-known regions.

ATLANTIC OCEAN.—Campagne Scientifique de la "Princess Alice," 1904. No scale. *Bulletin* of the Oceanographical Museum of Monaco, 1904.

A black map showing the itinerary of the "Princess Alice" in 1904, and the soundings made during the journey, those in the region of the Azores, completing the bathymetrical map of the archipelago just published. Gorringe and Monaco Banks are shown in insets on a larger scale. The chart illustrates the list of stations and soundings printed in *Bulletin* 19 of this Museum.

GENERAL.

THE WORLD.—L'Année Cartographique (Fourteenth year), Hachette & Cie., Paris, 1904.

The annual supplement to the geographical and map publications issued by Hachette & Co. The three-map sheets contain 16 maps, on which are indicated the additions to geographic knowledge, the boundary changes, etc., made in 1903–04. The Asia sheet shows the present status of railroad-building in Asia, the routes of Dr. Karl Futterer in northeast Tibet, and the itineraries of Grillières and Courtellemont in western China; the Africa sheet gives the results of recent explorations in the northern Sahara, the Chad Basin, southern Abyssinia, the Ivory Coast, the delimitation of the boundaries between the Ivory and Gold coasts and between Portuguese and French Guinea, and the new administrative districts of French West Africa and the French Congo; the America sheet shows the new boundary between Alaska and British America, the results of the latest expeditions by Commander Peary and the new frontier between Brazil and Bolivia. Text explanatory of the maps appears on the back of each sheet.

THE WORLD.—Sketch map of the Cotton Belt of the World. Mercator projection. Accompanying Prof. Dunstan's Report on "Cotton Cultivation in the British Empire and Egypt." London, 1904.

Colours show with rough approximation the producing areas in British and foreign territory, and also the British and other areas in which cotton-growing is now in the experimental stage.

BOOK NOTICES.

Ueber Naturschilderung. Von Friedrich Ratzel. Mit 7 Bildern in Photogravüre. München und Berlin. Druck und Verlag von R. Oldenbourg. 1904.

This last work of the great scholar, completed a few days before his death, is devoted to the systematic treatment of some problems which, though not immediately geographic, are of great importance in bringing forward the attractive sides of geography. It is dedicated "to all friends of nature, especially those who, as teachers of geography, or natural history, or history, wish to awaken an appreciation of the

greatness and beauty of the world in the souls of their pupils." Science alone is not sufficient to understand nature: to many a mind art and poetry are more intelligible interpreters. In this way the present agitation for artistic education can be made serviceable also to the study of geography, and geography in its turn can contribute toward a more general love and appreciation of nature.

The book is divided into three parts. First comes an introduction, which sets forth the relations between artistic and purely scientific description, and between science and art in general: their common purpose and foundation, namely, to help us to understand man and nature; and their difference of ways and means, namely, the difference between artistic and scientific truth, between artistic and scientific observation, artistic and scientific ways of thinking, and the historical relations of science and art.

The second part is given over to a discussion of the beautiful and the sublime in nature, and our association with it. The elements of natural beauty are found in curves, groups, repetitions, symmetry, frame, abundance, variety, movement, contrast in the landscape, while impressions of sublimity are explained by the vastness, stillness, volume, power, solitude, etc., of scenery. The paragraphs dealing with associations will be found of especial interest by scientific readers, as they serve to show how much our enjoyment of nature is increased and deepened by the scientific knowledge about it which, "like love, makes even homely objects interesting."

The third part contains practical criticisms of, and hints for, geographical description, the fruit of the author's extensive studies of geographical literature, from the earliest times to the present day. For any good description of geographical objects, accurate observation is the prime requisite. To observe means to search: *e.g.*, to search for what is essential. Since the freshness of the first impression can never be reproduced by memory, notebooks are indispensable to retain observations on the spot. In every book of travel one can distinguish what the author actually saw when he wrote and what he describes from memory alone. The so-called "ideal" landscapes which appear in some geographies are for this reason entirely worthless. Yet the personal element must never show in the description. Judgments based on individual taste, like "nice," or "pleasant," or "picturesque" etc., say nothing, and ought to be avoided. In a similar way long enumerations of mere names are devoid of meaning. In exceptional cases, as sometimes with Humboldt, they serve to produce an impression of abundance of life; but even that author incurred the blame of Jean Paul for "putting in the midst of our language the whole of Linné's Latin with nothing German about it but the tails of Germanized endings at the rear ends of the words." The overloading of sentences with descriptive adjectives, too, darkens rather than clears the description. The simpler the style, the more plastic the impression, as in Cowper's

> The primrose ere her time
> Peeps through the moss that clothes the hawthorn root.

This example also shows how much depends upon the proper choice of verbs: verbs expressing action or motion will always convey a more vivid impression than such as show us the objects stationary. Even the best description, however, can only supplement, not supplant, the picture, and *vice versa:* the test of the ability of both painter and writer lies in the realization of their possibilities and their limitations.

It is impossible in the limited space of a review even to allude to the many features which will make this book a mine of suggestions to every one engaged in geographic writing; for him who is conversant enough with German to make the application of the author's remarks to English examples the best that can be said about it is: *tolle, lege!*

M. K. G.

Forschungsreise in den zentralen Tien-schan und Dsungarischen Ala-tau im Sommer 1902. Von Dr. Max Friederichsen. Mit 86 Original-Abbildungen auf 52 Tafeln und 2 Original-Karten. Hamburg. L. Friederichsen & Co., 1904. (Mitteilungen der geographischen Gesellschaft in Hamburg. Band XX.)

The author records the results of his work as geographer and geologist of the expedition, sent by the University of Tomsk, into the mountains of Russian Central Asia under the guidance of Professor Saposhnikow. They relate particularly to the region south of Issyk-kul and around the Khan-Tengri in the Central Tien-Shan, and the Dzungarian Ala-tau. The geological aspect of the country is very uniform, the rocks being exclusively granites, gneisses, schists, and palæozoic formations. The topography closely corresponds to the geological conditions; three parallel ridges which emanate from the Khan-Tengri to the west are a succession of so many anticlines and synclines, and Issyk-kul itself appears to be embedded in a large synclinal valley. In Dzungaria, two lines of geological disturbance intersect each other, and produce curved ridges whose concave slopes look towards the north-west. The drainage, in the Khan-Tengri region, follows the longitudinal valleys, and is finally gathered in the transverse valley of the Sary-Dshas River, which opens an outlet to the south by cutting through all the three ranges. In Dzungaria the arrangement of the ridges producesa general northwest direction of the water-courses toward Lake Balkash. In no place do the mountains explored appear to have been submerged since the close of the Carboniferous (Permo-carboniferous) period. The results of this continued denudation are shown in the widespread Han-Hai sandstones and conglomerates which accompany the old formations almost everywhere; in a wide belt of rock waste, wider than in any other Alpine landscape between the forest and pasture belt of the lower, and the firn and glacier belt of the higher parts of the mountains, and in a very striking example of perfect peneplanation in the broad longitudinal Sary-Dshas valley, so striking that the Kirghiz designate them by the special name of "Syrt." They are wide steppe plains, perfectly level, dissected by the Sary-Dshas and its tributaries, in whose valleys the strata can be seen standing on edge, and further exploration will probably establish them as the most extensive area of undoubted sub-aerial denudation. Glaciers are not numerous nor large; the Semenow (pronounced Semyonnoff) glacier near Khan Tengri being the only one worthy of mention. Traces of a larger glaciation appear everywhere, but even they do not reach the amount of the first glaciation of the Alps. Issyk-kul, too, is far from being comparable to the Alpine lakes; for instance, to the Lake of Geneva, as has often been presumed from small-scale maps. It is a typical steppe lake, with flat and barren shores, and the mountains are so far away that only in remote geological times, when it may have stood much higher than at present, can it have extended to their base. Its shrinking has very probably been accelerated through the cutting off of the Tshu River, which formerly flowed through it, but whose upper course has filled up the bay where it entered the lake with its own deposits, and thus cut itself off from the lake and pursued a shorter route to reach the lower course through the gap of Buam in the north, the former outlet of the lake.

The book is a valuable addition to our information concerning a little-known country, and it is to be wished that the author may have another chance of visiting it in order to complete his investigations. These had often to be cut short on account of the general plan of the expedition, which was sent out first of all for botanical interests. The pictures are excellent and very well selected, and the two large-scale maps, on which not a single name mentioned in the text is missing, contain many

valuable contributions to the cartography of the region. Four appendices contain notes on the maps and tables of barometric and trigonometric measurements by the author, and petrographical and palæontological notes on his specimens by Petersen and Schellwien.

M. K. G.

Excursions and Lessons in Home Geography. By Charles A. McMurry. pp. xl + 152. New York, The Macmillan Company, 1904.

This little volume of suggestions as to the way of conducting work in home geography is one of a series for teachers, dealing with the different subjects of the elementary school. It has been preceded by a book on the method of teaching geography in the elementary schools, and will soon be followed by one or more books on the teaching of certain selected topics in geography in the upper grammar grades.

The book includes suggestions as to the observational study of local scenery in different parts of the country, of industrial geography as represented in the processes to be seen in shops and factories, of certain commercial topics, of the features of agriculture and dairying, and of government.

The author is a most successful teacher, and has tested his ideas by long practice. Yet the suggestions do not contribute to the cause of better geography teaching, for the reason that too much is included which even a liberal interpretation of "the study of the earth in its relation to man" will not allow us to call geography. A topic, to be geographical, must present clearly the geographical or earth-background to the human activities and operations which can be studied in a given region. The technical details of industries and the processes of city government are hardly geography, unless the reasons for the establishment of the given industry at a given place are clearly brought out, and the reasons, from the earth standpoint, for certain forms of government are given as a basis for details.

The book is well illustrated, and it offers many suggestions to teachers whether they agree with the geography or not. Often, however, these suggestions are of a kind that cannot be easily adapted to other places, and the work, as a whole, will not fit the ordinary school course of study in home geography.

The author deserves great credit for his insistence upon the teaching of geography from real things, and the advantage of excursions with young pupils. All phases of geography teaching need to be illustrated in the field and, of all phases, home geography suffers the most from being based on words, and not on things. So many teachers distrust their own powers in the conduct of excursions that it is good for them to see how easily excursions can be conducted and to have this shown, not by a theorizer, but by one who has done all that he outlines as possible for beginners.

R. E. D.

Physiography—An Introduction to the Study of Nature. By T. H. Huxley, revised and rewritten by R. A. Gregory. pp. xl + 423. The Macmillan Company, New York, 1904.

A new edition of Huxley's classic Physiography is a welcome edition to the available literature for schools and general reading. There are few books on elementary physiography that even approach the original edition of this volume in smoothness and clearness, and surely no book that an enthusiast reads with more pleasure. The author of the revised edition acknowledges that the task of revision has been a hard one, but it has been well done. The general order has been retained, the text has been changed but very little, and the result is a book of more general adaptability than the original.

The principal change in the new edition consists in the elimination of details of a geological nature, not of service to the beginner, and in the omission of references to the Thames Basin, except when that region can illustrate the point in hand better than any other. These changes make the book more simple and available for beginners, and make it stronger. The introduction of a new first chapter dealing with Maps and Map Reading brings to the front many facts that the reader will need for use in the later chapters. But it is a distinct shock to find Huxley's delightful first paragraphs yielding to a matter-of-fact presentation of somewhat dry essentials, even though the author has done his task well.

The book is well printed, the illustrations are chosen with care and are pertinent to the text, and the work as a whole deserves to be on the shelves of every one who is interested in the study and interpretation of the physical phenomena about him.

R. E. D.

Vom Kaukasus zum Mittelmeer. Eine Hochzeits- und Studienreise durch Armenien. Von Paul Rohrbach. Mit 42 Abbildungen im Text. Leipzig und Berlin, Druck und Verlag von B. G. Teubner, 1903.

This book proves that a scholar, even when travelling for pleasure, cannot help observing and recording in a scholarly way. While eminently readable and free from scientific technicalities, it must not be classed with the so-called "popular" scientific books. It contains most valuable information of geographic and ethnological character. The characteristics of Caucasian and Armenian landscape betray the professional geographer everywhere; the student of historical geography will find many interesting correlations between classical and modern geography; the sociologist will be interested in the problems of getting the nomadic Kurds settled in pursuits of agriculture, in the progress of civilisation in those parts of the country which are under Russian administration, as compared with those belonging to Turkey, and in the description of the national character of the Armenian people, which in the home country is so different from that shown abroad; the archæologist will delight in the descriptions of the treasures of one of the oldest civilisations of the world, hidden in the monasteries whose inhabitants "stand weeping by the grave of their nation"; the missionary and philanthropist will find valuable hints for a wise policy on that most dangerous soil. But certainly every one interested in the Armenian question ought to read the book, extracts of which are under publication, in English, by the Armenian colony in Boston. The fact that the author is not a professional Armenophile makes his records doubly valuable; it will be difficult to find a book which, without any missionary or reformatory tendency, gives such a vivid and obviously truthful picture of the conditions of that unfortunate country. Nothing can be more pathetic than to see how the impression of that indescribable misery grows upon even the unprejudiced traveller. Special praise ought to be given to the brave young bride who shared all the inconvenience and peril of the trip without flinching. It is greatly to be regretted that no more pictures are given, and a map of the country would greatly add to the usefulness of a second edition.

M. K. G.

Student's Laboratory Manual of Physical Geography. By Albert Perry Brigham. pp. vi + 153. New York, D. Appleton & Co., 1905.

Laboratory work in physical geography for secondary schools is still in a formative stage, and those working in the field are looking to the leaders, and especially to the writers of text books in physical geography, for help in making laboratory work worth doing and possible. Hitherto much of the laboratory work in secondary schools has been of the type that would be called in the elementary schools "busy

work." The thought has been that anything that would keep a person busy with his hands on some topic associated with physical geography, however remotely, might legitimately be called laboratory work, and be approved to college entrance boards as indicating a requisite training in this important phase of geography teaching.

The absurdity of this belief can be clearly seen by comparing this point of view with that held in physics and chemistry. In these subjects the work called for in the laboratory is either for the purpose of illustrating principles, which can be illustrated in this way better than by the lecture or laboratory demonstration, or for the sake of having pupils become efficient in solving personally problems in the sciences. In other words, the work is disciplinary, and thought-inspiring, and is distinctly chemistry or physics at all stages.

Geography will never reach a position of strength among teachers or college officers until the same disciplinary standpoint is held. The solving of problems, the studying of facts from the map and model standpoint, must therefore form the larger part of the work. We cannot consider the copying of a climatic map from an atlas laboratory work, but we can accept the making of a weather map.

Every contribution to the laboratory side of the subject must therefore be judged from the standpoint of whether it calls for work that makes progress in the subject more efficient and the knowledge better grounded, or whether it merely offers suggestions for "busy work."

From this standpoint the book before us is not as advanced as the excellent text-book, which it is supposed to accompany, deserves that it should be. There are many quantitative and strong problems presented; the student is called upon to get better acquainted with locational geography, and must think as well as merely look at maps. On the other hand, there are many problems presented that could be answered from an ordinary school atlas by a pupil yet two years below the high school. There are also many problems or questions, in reference to topics, that are of little value for making the larger point clear. For instance, why should pupils work out the date that Magellan sailed? where he wintered? how many of his ships reached the Cape of Good Hope? etc. Is this laboratory work? Does it help in making clear the shape of the earth? Could not the same amount of time, devoted to other and better work in the laboratory, produce clearer impressions in reference to the shape of the earth in a shorter time?

In spite of the elementary character of the outline, the book is suggestive, as all laboratory manuals are, and is a distinct contribution to the cause, though not as valuable a contribution as the times warrant. R. E. D.

La Propriété rurale en France. Par Flour de Saint-Genis. xviii and 445 pp. and three maps. Armand Colin, Paris, 1902. (Price, 6 francs.)

The Academy of Moral and Political Sciences in Paris proposed in 1901, as a topic for monographs in competition for the Léon Faucher prize, "The Present and Future of large, medium, and small landed properties in France." The prize was awarded to Mr. Flour de Saint-Genis, and this volume is the work that won for him the coveted distinction. The author is well known in France as a writer on economic topics. He traces the history and distribution in France of large, medium, and small estates and their influence upon the commonweal, marshalling many statistics and authorities to prove the validity of his contentions. The book is a complete, conscientious, and penetrating study of a large social question. Three maps show the distribution of rural real estate in France, according to these three groups, among which landed property is divided.

OBITUARY.

FRANCIS H. NICHOLS.

A telegram from the American Consul-General at Calcutta, received on the 29th of December, 1904, announced to this Society the death of Francis H. Nichols on that day at Gyangtse, Tibet.

Mr. Nichols was born in Brooklyn, October 31, 1869. He grew up in Chicago, to which city his father had removed in 1870, and there he began his business life. In 1895 he found employment with a firm in New York, a position which he left to become a reporter for the press. In 1901 he was commissioned to visit the famine districts of Western China and report on the distribution of the famine fund. His observations and studies of Chinese life are recorded in his book, *Through Hidden Shensi*, published in 1902.

In the autumn of that year Mr. Nichols planned another expedition to Western China and Tibet, with the intention of making his way into Lhasa. His plan was submitted to the Council of this Society and approved, and in March, 1903, he left New York for China. In Peking the Imperial Government accorded him every facility, and he set out upon his journey to the westward, travelling in Chinese garb with the Chinese, and by slow stages. In May, 1904, he reached the frontier of Tibet, where he engaged his carriers, and in June began his march towards Lhasa. At a point about fifty miles west of Chamutong the carriers refused to go any farther, and Mr. Nichols was forced to turn back. He made his way alone to Mandalay, in Burma, and from there to Darjiling and Chumbi, in the hope of entering Tibet from India, but he was not allowed to pass.

It is not known how he entered Tibet, but he telegraphed to the Society on the 8th of December his arrival at Gyangtse, "All well." The story of the next three weeks is told in the copy of a telegram enclosed in a letter to the Society from the British Ambassador at Washington. On the 10th of December Mr. Nichols was taken ill with influenza and fever, and on the 24th pneumonia set in. That very day the sick man sent a message of Christmas greeting to his father and mother; his last word to them.

During his illness Mr. Nichols received every care and attention from Captain Steen, British medical officer at Gyangtse.

The life thus suddenly brought to a close leaves behind it the memory of a loyal and unselfish character, richly endowed with qualities that promised the attainment of a lasting renown.

BULLETIN

OF THE

American Geographical Society.

Vol. XXXVII **1905.** **No. 2**

A MENACE TO THE NEW YORK HARBOUR ENTRANCE.*

BY

LEWIS M. HAUPT, C.E.

> These restless surges eat away the shores
> Of earth's old continents; the fertile plain
> Welters in shallows, headlands crumble down,
> And the tide drifts the sea-sand in the streets
> Of the drowned city.
>
> WM. CULLEN BRYANT.

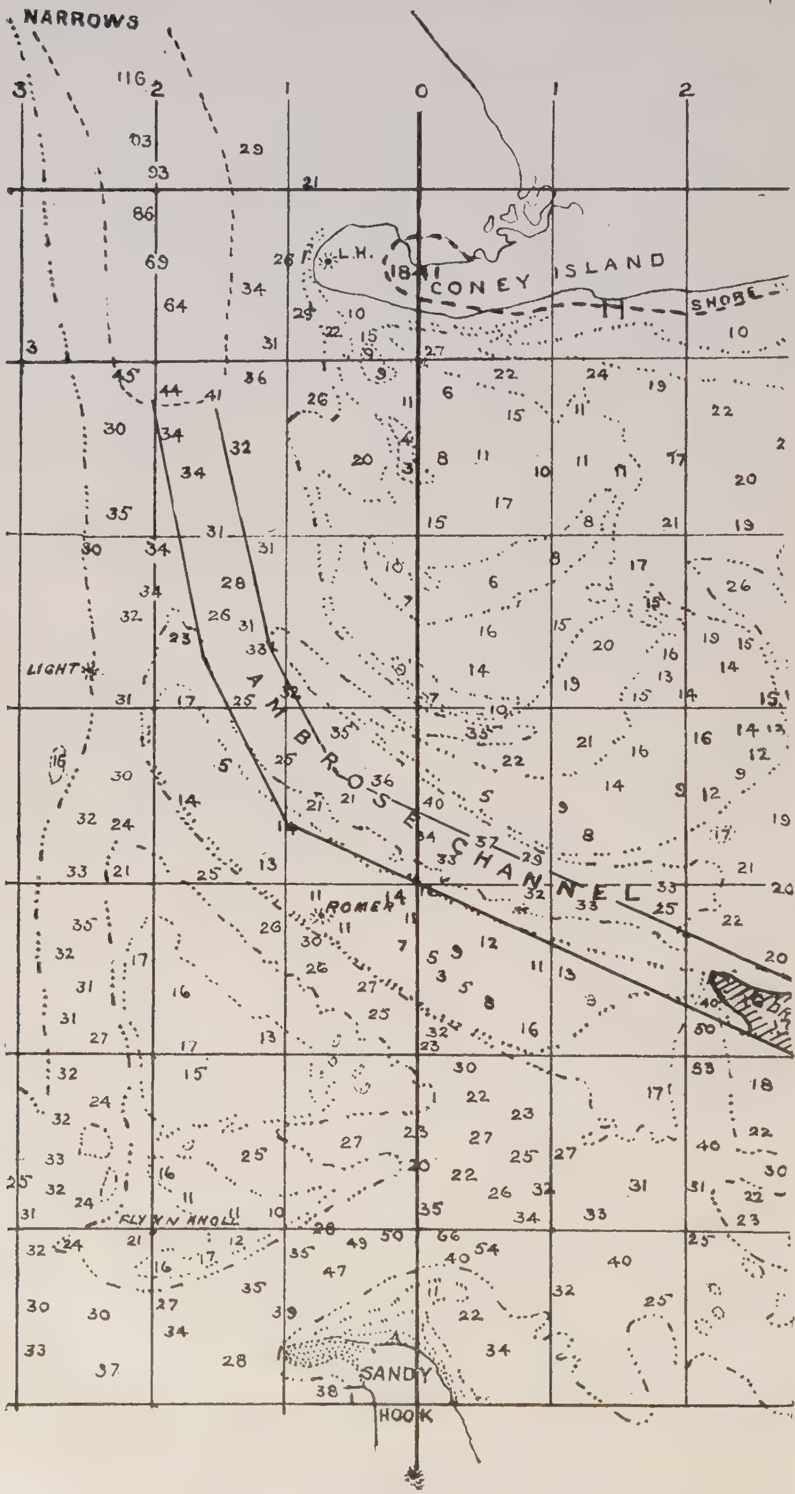
At the Buffalo meeting of this association, in 1886, the writer had the honour of submitting a paper on the "Problem of the New York Entrance," in which were set forth the peculiar physical conditions existing on the bar stretching from Sandy Hook to Coney Island, and suggesting a method of so modifying the ebb current passing out at Gedney's Channel as to increase the depth by natural erosion.

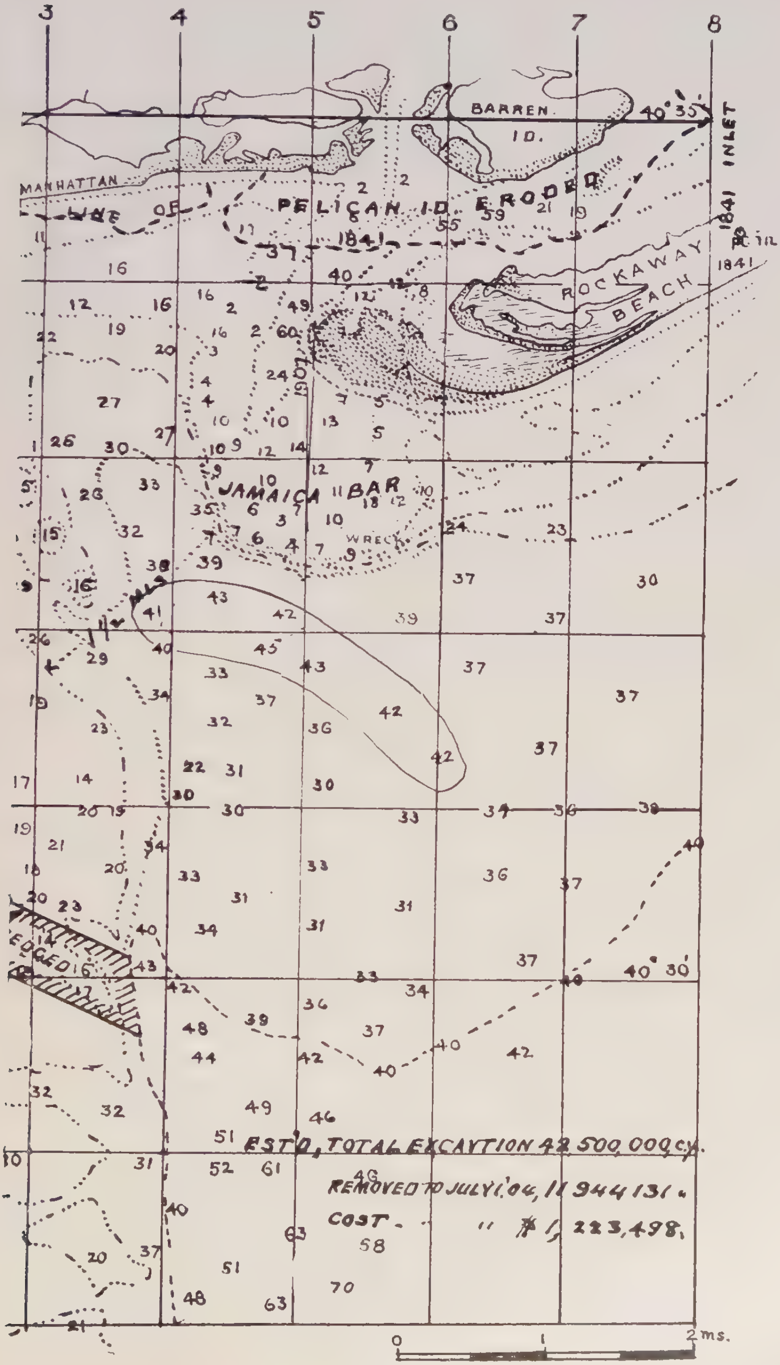
At that date the limiting depth in this, the deepest natural channel, was 23·3 feet at mean low water, which, with a mean tide of 4·8 feet, gave 28·1 feet at high stages, so that vessels drawing 27 feet have passed over it at extreme high water prior to improvement by dredging. In 1884 a report was submitted to Congress urging the enlargement of the channel to a width of 1,000 feet and depth of 30 feet by dredging, at an estimated cost of $970,000, as follows:

Improving Gedney's Channel for 30 ft., M.L.W.................	700,000 c. y., at 50 cts.
Improving Main Channel for 30 ft., M.L.W......................	1,550,000 c. y., at 40 cts.

and it was expected that these channels would be "self-sustaining for many years." The Board of Engineers dissented from this

* A paper read before the annual meeting of the American Association for the Advancement of Science, held at Philadelphia, December 26–30, 1904. (*From advance sheets, by courtesy of the Franklin Institute.*)


NARROWS
L.H.
CONEY ISLAND
SHORE
LIGHT
AMBROSE CHANNEL
ROMER
FLYNN KNOLL
SANDY HOOK


3
4
5
6
7
8
BARREN ID.
40° 35'
INLET
1841
MANHATTAN
LINE OF PELICAN ID. ERODED
1841
ROCKAWAY BEACH
1841
JAMAICA BAR
WRECK
EDGE
EST'D, TOTAL EXCAVTION 42,500,000 c.y.
REMOVED TO JULY 1, '04, 11,944,131 "
COST - " $1,223,498.
0
1
2 ms.

view, however, and stated that it had "little expectation that anything more than temporary relief could be obtained from dredging on a bar exposed to the full force of the Atlantic, and hence cannot recommend that method for a permanent improvement." It therefore suggested a dike extending in a S.-S.E. direction from Coney Island at a cost of about $5,000,000 or $6,000,000. As this dike would have closed the Coney Island, Fourteen Foot, and East Channels, and would have reduced the tidal ingress, it was not built, and the method of dredging alone was adopted. The Board was fully cognizant of the fact that the sand was being moved from the adjacent shore of New Jersey and Long Island into the Lower Bay, as indicated by the spits at Sandy Hook and Coney Island; but the extent of this movement does not appear to have been very fully considered, although an important factor in the relative cost of creating and maintaining the channels. Especially is this true in view of the greater demands which modern vessels are exacting as to capacity and draught. Instead of 30 feet depth and 1,000 feet width, there are now required 40 feet and 2,000 feet, respectively.

It has also been found necessary to maintain the 30-foot channels by dredging at an annual charge of about $50,000, with no resulting increase of depths, so that in 1899 the project of opening a more direct channel *via* the East or Ambrose passage by dredging to a depth of 40 feet and a width of 2,000 feet was approved by Congress, provided the cost should not exceed $4,000,000 for the removal of the 42,500,000 cubic yards then in place.

Under the 30-foot projects the amount expended up to July 1, 1904, was $1,967,111.82, or about $1,000,000 more than the estimate even at the very high unit prices of 40 and 50 cents per yard.

Under the 40-foot project, to same date, there has been expended $1,223,498.52, and "11,944,131 cubic yards have been removed." From this statement it appears that the general cost has been 10¼ cents per yard in the Ambrose Channel.

In the report of the Board, composed of Generals J. C. Duane, Henry L. Abbott and C. B. Comstock, three of the most experienced members of the Corps of Engineers, it was stated that the movement of sand towards the New York entrance was manifested by the "form of Sandy Hook, a sand spit about 5 miles long, which has been slowly built during past ages by this northward movement of sand along the New Jersey shore. It appears to have reached a limiting length . . . and in the last 145 years its length has varied only about 2,700 feet. . . . An examination

of the charts of Coney Island shows that its western end is moving westward as sand is moved to it, the motion of its 18-foot curve amounting to 800 feet between 1835 and 1881."

Unfortunately, this report does not appear to state the probable amount of material carried on to the bar by these two littoral movements. It is to set forth the great importance of providing for this menace to the entrance in the near future that some attention will be given to it in this paper. While physicists may be more especially interested in the vertical movements of the earth's crust, as suggested in the recent paper of Prof. J. W. Spencer on the submarine Great Cañon of the Hudson River, these internal forces do not appear to have sensibly affected the depths of the channels for commercial purposes within the range of modern records, so that the investigation of the volume and rate of drift wlll be confined to its horizontal littoral transportation.

For this purpose the British, Dutch, Swedish, and Spanish charts of the early explorers and settlers of the seventeenth century are found to be of no value, being apparently merely a collection of itinerary sketches of the general conformations of the coast, as seen from their vessels. Neither are movements which have passed their climaxes and reached a condition of equilibrium, or which are undergoing a transition under the new conditions which previous cycles may have imposed, as exemplified in the successive hooks which characterize the peninsula of Sandy Hook, where the third reflex spit is now forming.

Data.—An early colonial map of 1626 shows Sandy Hook under the name of Goodwin's Point, after whom the Lower Bay was also named, but it gives no geographical positions. The first charts of value for comparative study to which the writer has had access are those in the American Atlas, published by Wm. Faden, Charing Cross, London, in 1779, and collated by British officers during the Revolution. One of these, by Lieutenant Bernard Ratzer, of the Sixtieth Regiment, drawn from a survey of 1769, shows the New York Bay and Long Island on a scale of 6.6 miles to an inch. Another, being a detailed survey of the Hudson River and its mouth, published October 1, 1776, is on a scale of 4 miles to an inch, and a third, by Claude Joseph Sauthier, representing the entire State in sections, scale about 5 miles to an inch, was published in 1779. These three have been reduced to the same scale of 5 miles to the inch and superimposed for comparison as to position of shore-lines. The discrepancies, smallness of scale, and uncertainty of dates are such as to render them of comparatively little value, but they

show the progressive movements of the inlets to the bays on the south shore of Long Island and the opening and closing of the breach at the mouth of the Shrewsbury River, N. J. Also the beginning of the outer beach, now covering "Rockaway Neck" and Jamaica Bay, and threatening the New York bar. The State map of 1779 makes the distance from the Battery of New York City to Sandy Hook Light only 14 miles, instead of nearly 17 as given by the Coast Survey charts, thus discrediting its accuracy and confining this investigation to the later and absolutely reliable charts of the U. S. Coast and Geodetic Survey and those of the U. S. Corps of Engineers.

Co-ordinates.—As a basis of orientation the Sandy Hook Lighthouse is taken as the origin, since its co-ordinates are practically identical on the British and American charts.

The axes of reference are the meridian of the lighthouse and the parallel of 40° 20′ 35″ N. latitude. On this meridian and parallel therewith, cross-sections have been constructed from the Coast Survey charts of 1841 and 1901 by dividing the arc of latitude into minutes (or 4,620 feet intervals) and taking the sectional area of the water extending for a distance of 3 knots southward. The area thus covered extended about 7·5 knots east and 3 south, embracing the travelling bank in front of Jamaica Bay and reaching beyond the old inlet of 1841.

The gain or loss in the water cross-sections indicates the amount of erosion or deposit in the past sixty years; but it should be noted that this is merely the local resultant change, and that it by no means represents the total movement of drift. This latter quantity can best be ascertained only when it is finally impounded in the bight of some re-entrant having no internal tidal compartments. Along an open beach with numerous receptive inlets and a great bay at its terminus, all acting as pockets for sand, it is indeterminate, except by constructing an extensive groin to intercept it. Along an unbroken beach the volume of drift may be very large, yet the net changes, after its equilibrium is established, may be very small, or zero. When a breach occurs, however, the sand enters, and is precipitated on the inner bars and islands, until the inlet drifts past, and the bay or sound becomes closed to the littoral material, which then travels on to the next dump. The outer bar resulting from the effluent currents of the bay modifies to a great extent the action of the littoral forces by deflecting them in part around the submerged obstruction which they are constantly attacking on the windward side, from which the sand is

eroded and carried by a circuitous path to the leeward slope. At the toe of this latter slope and along the beach front beyond the bar there is apt to be erosion from the eddy caused by the returning currents. These generalities are illustrated by the following tabular exhibit computed from the cross-sections of the Coast Survey charts of 1841–1901, with such intermediate sections as were necessary to locate the scarps and counterscarps of the channel at these dates, or after sixty years' interval. The sections are arranged from east to west, to follow the direction of the movement. Between Nos. 7½ and 10, inclusive, there has been an increase of the water section or scour, but auxiliary sections extending farther east to Rockaway Life-saving Station show no material change, unless it be a deepening beyond the five-fathom curve. Between the Jamaica and New York bars there has been a small amount of scour in the flood-tide channel under Coney Island, and a recession of the beaches, which is pronounced along Plumb and Pelican Islands. A submerged ridge has formed in this trough, which has reduced the depths from 28 to 15 feet—a loss of 13 feet.

COMPARATIVE MARINE CROSS-SECTIONS OF VICINITY OF JAMAICA INLET, EXTENDING FROM THE MERIDIAN OF SANDY HOOK LIGHT EASTWARD 46,200 FEET, 8.75 STATUTE MILES, AND SOUTHWARD FROM LATITUDE 40° 35' N. THREE KNOTS. FULL INTERVAL = 4,620 FEET.

NO.	DATE 1841. SQ. FT	DATE 1901. SQ. FT.	DECREASE. FILL — SQ. FT.	INCREASE. SCOUR +.	VOLUME. CUB. YDS. DEPOSITED.	REMARKS.
10	384,635	433,323	—	48,688	—	—
9	256,829	338,381	—	81,552	—	—
8	241,847	266,568	—	24,721	—	—
7½	172,842	253,177	—	80,335	—	Scarp of 1841.
7	323,775	227,616	96,159	—	2,079,000	Through inlet and bar of 1841.
6½	288,476	232,485	45,991	—	5,250,000	Counterscarp of 1841.
6	293,345	216,661	76,684	—	6,160,000	—
5½	320,123	189,883	130,240	—	8,840,000	Scarp of 1901 { Deposited outside, 182,580 / Scour inside...... 52,340
5	329,861	202,055	127,806	—	11,300,000	Gorge of 1901.
4½	355,422	233,702	121,720	—	13,700,000	Counterscarp.
4	322,581	402,893	80,312	—	5,555,000	—
3	323,775	283,607	40,168	—	10,000,000	—
2	206,924	234,919	—	27,995	2,000,000	—
1	158,236	186,231	—	27,995	—	—
0	121,937	139,978	—	18,041	—	On Sandy Hook Meridian.
Av.	273,374	249,432	23,942		64,844,000	Deposited in 60 years ±.

The difference of the mean sections gives an average reduction of 23,942 square feet, or about 900 cubic yards per lineal foot, which for the total distance of 46,200 feet would give 693,000 yards per year as compared with the nearly 1,100,000 as included in the bar reach and representing its annual increment.

The bar proper covers a length along the beach of about 3½ miles and extends seaward nearly the same distance, while the direction of its movement has changed since passing Rockaway Station from west to nearly southwest, and this, if continued, will pass through the Light on the Romer Shoal and bisect the Ambrose Channel. It is now but 2½ miles distant from the 6-foot contour of the Jamaica bar to the 14-foot depth at the end of the new channel. There are no points between reaching to 40 feet excepting a small basin ½ mile wide, having one sounding as great as 46 feet, and as the Jamaica bar rolls up on the outer slope of the main ridge with its diminishing depth, the rate of progress will be more rapid and the distribution of material more extensive.

The table above shows the maximum reduction of the cross-section of the waterway at Station 5½ (the present scarp) to have been 130,240 square feet, which is greater than the entire area of the waterway for the 3 knots covered by the initial section at Station O, so that there is not space on the bar for this deposit without spreading to the southward and flowing into the channel, just as the spit at Sandy Hook is now changing its direction and moving to the westward as the ramparts of the sea encroach upon the gateways of the tide.

Rate of Approach.—Under these conditions the question naturally arises as to how soon this great increase in the volume of material may be expected to reach the bar, and it is one more readily answered than that of quantity, since a comparison of the authentic Coast Survey charts from 1841 furnishes evidence that the progression of the easterly spit of Jamaica Bay has been 2⅞ miles in sixty years, or at the annual average of 253 feet—that is, 1 mile in 20·86 years. If the British chart of 1776, made by Sauthier, be taken as reliable, the rate has been about 7 miles in 125 years, or 295 feet per annum. One mile in eighteen years, nearly.

As a further check under somewhat similar conditions of exposure and activity the charts for Fire Island show a westerly drift of 11,600 feet in 52 years, or 224 feet a year. The Board of Engineers of 1897, in reporting on the conditions at Aransas Pass, Tex., on the Gulf of Mexico, stated that "for many years it moved in a southerly direction. . . . The annual rate of movement from 1868 to 1878 was about 260 feet."

These few instances will serve to show that a movement of about 260 feet a year is not abnormal, and may be accepted as safe, so that the 40-foot basin should be crossed in about ten years, after which the rate should be more rapid in mounting the scarp of the

outer bar. As it will require about ten years to remove the original material in place, in the Ambrose Channel, which is already reported to have filled from 3 to 7 feet, where work has been done, it will be seen that the problem assumes a serious aspect, and there would seem to be no question as to the futility of attempting to create, and especially to maintain, a channel by "dredging on a bar exposed to the full force of the Atlantic," which the Board of 1884 could not recommend for its permanent improvement. But this is not all; for, while the marine forces of the Long Island littoral are so rapidly storming the left flank of the enceinte, those of the New Jersey coast are likewise attempting to turn the right and rear. It is, therefore, necessary to reconnoitre in this direction to ascertain the force of the enemy and his line of approach.

Growth of Sandy Hook.—The encroachment of this peninsula of sand, extending northwardly across the entrance for a distance of five miles, has long been a subject of investigation and a cause of alarm, lest it ultimately close this portal to the harbour. The U. S. Coast Survey Commission made a special report on this subject in 1857, in which it said:

The disastrous result of the continued growth of Sandy Hook into the main ship channel, its progress having been for the last century at the rate of nearly "a sixteenth of a mile in twelve years," needs no exaggeration to give it importance. . . . If its encroachments in the same direction were continued beyond certain limits, the destruction of the harbor might ensue.

Within twenty years (1835–55) the point has grown to the northward 220 yards. It is altogether probable that the future progress of commerce will render the deepening of the bar a vital question.

The half century just closed has fully confirmed these predictions, and lends weight to the need of a more extended analysis of the rate and direction of the drift which is gradually throttling this mouth of the bay. The rates of growth above cited give an average of twenty-six feet per annum for the century, and 33 feet for the score of years, but the variations in the progress of the spit will be more clearly exhibited by the subjoined tabular statement, compiled from numerous charts, some of which are of doubtful authenticity, and hence of little weight. As the opening and closing of the mouth of the Shrewsbury River at the foot of the Hook is a factor in the travel of drift, an effort has been made to determine the dates when open. An old provincial map of New Jersey, published by Seller and Fisher in 1676, shows a small projection of $\frac{1}{10}$ of an inch in length on the site of Sandy Hook, connected with the mainland; but as there is no scale, it is valueless. A map of New York and Perth Amboy Harbours in 1733, drawn to scale and apparently made from surveys, is taken amongst the earliest reliable maps for this study. On this chart the Hook is but three miles long, which is apparently erroneous as compared

with Lay's map of 1724. The depth of 19 fathoms in the Narrows and 3½ in the main Ship and Gedney's Channels are the same as those prior to the dredging, commenced under the project of 1884.

MOVEMENTS OF SANDY HOOK AND CONDITION OF SHREWSBURY INLET.

DATE (YEAR).	LENGTHS (MILES).	FEET.	AUTHORITY.	INLET CLOSED OR OPEN.	AVERAGE RATE PER ANNUM IN FEET.	REMARKS.
1724	4·00	21,120	Amos Lay.	Closed.	For 50 years to 1776 there seems to have been no advance.	Scale 7m = 1''
1733	3·00*	15,840	Not stated.	"		" 3⅓m = 1''
1769	3·96	20.909	Lt. Ratzer.	"		' 6⅔ = 1
1776	4·00	21,120	(Hudson River.)	"		" 4m = 1''
1778	4·40	23,232	" Lord Howe."	Open.	1,056	" ¾ = 1''
1779	4·4	23,232	C. J. Sauthier.	"	0	" 5 = 1''
1782	4·5	23,760	Lt. J. Hills.	"	176	" $\frac{1}{10000}$
1819	4·53	23,918	Capt. LeConte.	Closed.	4	" "
1836	4·67	24,657	U. S. C. Survey.	Opened in 1835.	43	" "
1841	—	—	"	"	—	" "
1842	4·80	25,344	"	Closed.	114	" "
1844	4·83	25,520	"	—	88	" "
1848	4·83	25,520	"	Open.	0	" "
1850	4·80	25,344	"	Closed.	− 88	" "
1851	4·78	25.388	"	Open.	+ 44	" "
1855	4·77	25,335	"	Closed.	− 13	" "
1857	5·00	26,400	"	" †	+ 530	† Permanently by railroad.
1863	—	—	—	"	—	Severe storm cut away, making jetties and rip-rap necessary, 2,575 feet long.
1881	4·9	25,872	—	"	− 26	
1891	4·8	25,344	U. S. C. Survey.	Closed.	− 75	Scale $\frac{1}{40000}$

A glance at the rate-column shows some very eccentric features, and impresses the need of systematic records at stated periods as a basis for definite conclusions. It would appear that, for the half century from 1724 to 1776, the spit was in a condition of equilibrium (neglecting the survey of 1733). During Lord Howe's occupation a spit of sand nearly half a mile in length extended to the north-west, and the fast land soon followed it. Another cycle occurred between 1779 and 1848, a period of sixty-nine years, during which ·43 of a mile, or 2,288 feet, were reclaimed from the sea, giving an average progression of 33 feet per annum. Since 1848, whilst there has been fluctuation, there is no material advance upon the channel northwardly, but instead there has been a protrusion of a long spit

* Distance uncertain. † Six feet deep.

of a half mile to the westward, forming the third cove on the inner face of the Hook.

The revetment of the head of the Hook after the severe storm of 1863 checked the erosion to some extent.

In 1881 the nucleus of the westward movement was shown to have commenced. Taking the depth at 45 feet, with slopes of 1 on 12, this deposit to date would represent approximately 10,000,000 cubic yards, or about a half-million a year, which has been arrested under the lee of the Hook, notwithstanding the inner littoral current which prevails for eleven hours out of the twelve. This does not represent, by any means, the additional amount of sediment carried into the bay in suspension and deposited in its channels and on its bars. The annual dredging required to maintain the full dimensions of Gedney's Channel, especially on the south side of the cut, indicates the presence and source of this material.

This may be checked by the larger deposit made on the Hook proper between 1776 and 1857, when it advanced nearly a mile in length and expanded to a mean width of a mile. The uncertain element in this computation is the mean depth of the bed, but as there is always a deep-water reaction basin at the head of such spurs reaching to between 50 and 60 feet, it is safe to assume the depth of the fill at 15 yards. With these dimensions the yearly deposit has been 581,000 cubic yards on the fast land of the Hook, thus confirming within reasonable limits the probable annual deposit in this vicinity to be in round numbers 500,000 cubic yards. The northern mile of the Hook contains about 46,500,000 yards in place.

Unfortunately, the data contained in the above table furnish an uncertain basis from which to determine the age of Sandy Hook, but in the period of eighty-one years between 1776 and 1857 it apparently advanced one mile, or at the rate of about 65 feet per annum. To cover the entire five miles at this rate would require about four centuries, leading back to the date of the discovery of America. It is highly probable that the rate was much less at an earlier date, when the coast to the southward was indented with numerous inlets, which have nearly all been closed by the northward littoral drift and converted into fresh-water lakes. The only important openings to-day are those of Shark River and Manasquan, until Barnegat is reached, where the drift is to the southward.

From the foregoing statements it would appear that both flanks of the entrance are menaced by large deposits of sand in place, whilst the flood-tide is augmenting this volume by material carried

in suspension, thus hastening the deterioration of this entrance by these encroaching banks.

THE GREYTOWN HARBOUR.

That this is no idle fancy will appear from a brief consideration of the physical conditions at the mouth of the San Juan del Norte at Greytown, Nicaragua, upon which so much stress has been laid in recent years. Here the trade-wind, rather than the tide, is the predominating element to drive the waves to the westward and extend the Hook in that direction, so that the excellent roadstead which existed in 1832 was completely sealed in 1865, during which period of thirty-two years the spit had advanced over a mile and a half, moving at an average rate of 291 feet each year.

A careful computation from comparative cross-sections of this cordon of sand, covering a period of some forty years, made by the writer on the spot in December, 1897, gave the annual deposit as 582,000 cubic yards during the latter part of the movement.

By a comparison of the survey of Commander Lull, of 1872, with that of Captain West, of 1865, covering a little more than seven years, after the lagoon had been formed, Prof. Henry Mitchell estimated the average yearly deposit on the sea slope of Punta Arenas to be 730,000 cubic yards. Here the coastal plain is characterized by five distinct lagoons—Ibo, Barco, Sucio, Shepherd's, and Greytown—having their axes nearly parallel and from 3,000 to 3,750 feet apart, all to leeward of the salient and within three miles of the coast, thus demonstrating the persistence of the forces and their cyclic results. The short pier of 1,000 feet, built by the Maritime Canal Company, arrested this drift and caused a general advance of the shore-line to windward for a distance of more than a mile. It also opened and maintained a channel into the lagoon until the groin filled up. This typical instance is cited to illustrate the gravity of the encroachments upon the New York bar where the aggregate deposits are more than twice as great, being concentrated from both the Long Island and New Jersey coasts, as from a funnel, upon the bar stretching from Coney Island to Sandy Hook.

Land Titles.—Aside from the physical, engineering, or commercial importance of this question there is the legal one of proprietorship. Stakes, pins, or landmarks driven into these travelling beaches do not hold them down, and the inaccuracies of the early colonial surveys and descriptions are so vague as to lead to great confusion. In a Supreme Court decision rendered in July last in favour of the town of Hempstead, Long Island, the defendant, based

upon surveys several centuries old, the Court ruled "That old maps of the beach on Long Island are but slight evidence of the condition of the beach or the location of the inlets at a period fifty years earlier, even though correct at the time made. It is a fair presumption that the constant shifting in the various inlets of Rockaway Beach, on Long Island, shown to be going on at the present time, was going on in 1725." From this it appears that such a description as is contained in the deed of "A beach lying on the south side of the Island at a place called Rockaway" is not such as would convey title to a definite tract of land subject to the action of such physical forces. For the purpose of preserving to the rightful owner the full possession of his property, therefore, it becomes of importance to establish well-defined reference marks and to ascertain by frequent and systematic examinations the character and amount of the changes which are taking place as a basis for the best method of reclamation and protection to riparian owners, with correlative aid to commerce and marine industries.

The Remedy.—In view of the situation the preventive measures seem to be self-evident; yet thus far no permanent regulating works are contemplated which look to the modification of the tidal forces, either to diminish the rate of encroachments from the flood-driven sand-bars or to augment or localize the energy of the ebb scour, so that it is risking nothing to say that the Board of 1884 was correct in its judgment as to the inexpediency of attempting to meet the demands of commerce by dredging. If it were true then it is more so now, and yet it is quite possible so to control the ebb currents by a permanent training wall as to cause them to cut out and maintain by their own energy an ample channel across this bar. Such a structure would not obstruct nor close any of the existing channels, but would protect the Ambrose Channel from drift and would cost only about one-half the amount estimated for merely the preliminary dredging of the proposed channel. This should be supplemented by auxiliary works to impound the travelling sands in natural depositories, where they will become valuable instead of injurious, and prevent the ultimate formation of a new beach in front of Manhattan and Coney Island, which would then be on a bay a mile or more from the sea.

The details as to plans, dimensions, mode of construction, materials, and cost of these works belonging more properly to the subject of the Engineering Section, are consequently omitted from this paper, which is respectfully submitted for discussion, though with a consciousness of the deficiency and unreliability of the earlier data.

THE LAKES BESIDE THE LOWER TARIM.

BY

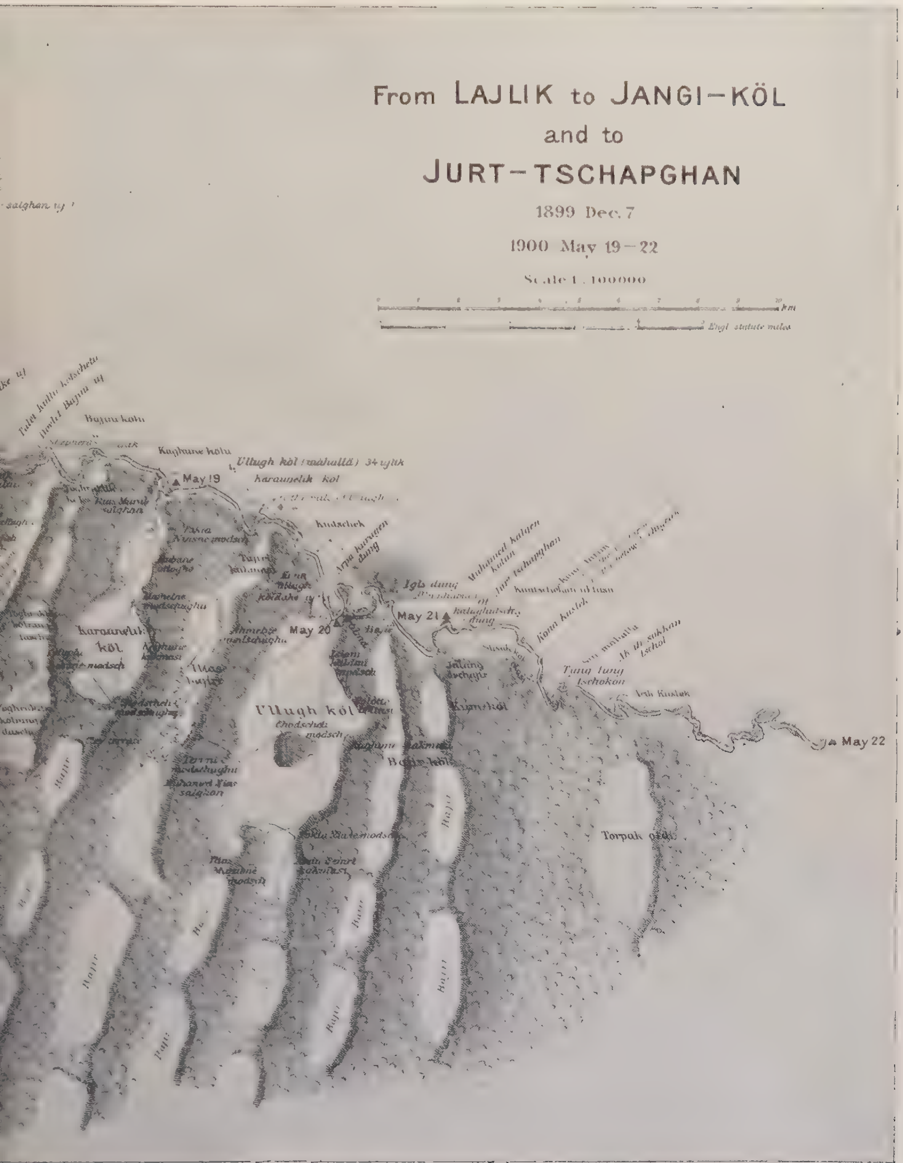
DR. SVEN HEDIN.*

It was on the 6th and 7th December, 1899, that I passed the first links in the chain of curious lakes which stretches along the right bank of the Tarim after it turns to the southeast, or, generally speaking, along the stretch between Karaul and Arghan. These lakes are in every respect of such a strange and uncommon character that at the first glance it is impossible to understand how they can have originated or how the contours and the hydrographical relations of the region can have contributed to their formation. One would naturally suppose that, the river here washing the feet of sand-dunes 90 meters high, this would be precisely the last quarter in which to look for the creation of lacustrine basins. And yet it is in this very locality that we find a continuous series of lakes possessed of a depth greater than we find in the river itself immediately adjacent. I have investigated and sounded some of these accumulations of water, and will now proceed to describe them in order, and thereafter deduce the conclusions which are directly suggested by the ascertained facts.

But before proceeding to discuss my own experiences, I ought to state first what was already known about these lakes—and it is not very much. The only traveller who has visited the region is M.V. Pjevtsoff, though he can only have seen the dunes at a distance. What he says about them is as follows:

> Southwest of the Jarkent-darja extends the lifeless desert which the natives call Kettek-schaari-kum. It is covered by gigantic accumulations of sand, lying almost north and south, and between them are sandy expanses, consisting of low, flat *barkhans*, which resemble waves of the sea. The stupendous sand ridges approach in several places almost to the very brink of the river, though in other places they are as much as 10 versts from it; everywhere, however, they are plainly visible from the road. It is not so very long since the wild camel used to frequent this desert, and the natives to hunt him in the autumn and winter, but ten years ago he disappeared and took up his habitat elsewhere. The last wild camel is reported to have been seen amongst the sand south-west of the village of Jangi-su. The native hunters are of opinion that these wild animals have travelled southwards down the lower Jarkent-darja (Tarim), and thence made their way up to the Tscherschen-darja to the stony, sandy desert which extends southwest of the locality of Vasch-schaari, where it is commonly reported that the wild camel is still to be found in large numbers. . . . .

* The remarkable lakes which Dr. Sven Hedin discovered during his last visit to Central Asia are described in Vol. 1 of his "Scientific Results of a Journey in Central Asia, 1899-1902." His description and explanation of the existence of these lakes in the desert are given here so far only as to convey an idea of their present aspects and probable genesis (Chap. XVI, pp. 227-230, and Chap. XIX, pp. 305-306). A photographic reduction of sheet 12 of Dr. Hedin's Atlas shows the relations of the lakes to one another, the Tarim River, and the sand-dunes.


From LAJLIK to JANGI-KÖL
and to
JURT-TSCHAPGHAN
1899 Dec. 7
1900 May 19-22
Scale 1:100000
km
Engl. statute miles
May 19
May 20
May 21
May 22
Ullugh köl
Karaunluk köl
Kumköl
Torpak ötö
Igli dung
Kudschek
Kaghune kolu
Bajir

Asia 1899–1902

Constr. and drawn by H. Byström

The inhabitants of the region described live principally by fishing, only in part by agriculture and hunting. They take their fish almost entirely in lakes artificially made in the depressions along the river banks, and fill these natural depressions by means of canals, 150 to 1,200 saschen long, which were dug by their ancestors. All these lakes have been full of water for many years, with the exception of the Ettek-bair, a lake about 8 versts in circumference, which was only filled in 1886. In the same locality there are counted a dozen such lakes, seven large ones and five small ones. They all lie on the right bank of the river, and their shores are overgrown with tall reeds. The largest lake, Jangi-kul, is about 15 versts long by 2 versts broad, and its' depth amounts to 3 saschen. The next largest, Basch-kul, is 12 versts long, 1 verst broad, and 3 saschen deep. The area of the other five large lakes is only about one-half the area of Jangi-kul; while the five small lakes measure each one to three versts in circuit.*

All these lakes are cut off from the river, though each has communication with it by means of its inflow canal, but outflow they have none. All the inflow canals are stopped with earthen dams, and are only opened periodically to let in fresh water from the Jarkent-darja just before the autumn floods. The inflowing currents bring with them into the lakes large quantities of fish; as soon as the river begins to drop, the canals are closed and the fish retained in the lakes. Water is let into the small lakes every second year, and into the large ones every third or fourth, and in some cases every fifth year. In the year when water is not let in, the volume of the lake decreases a little, and its water acquires a slightly brackish flavour, and with each year that the lake remains without a fresh inflow the salinity increases, until in the fifth year it is extremely bitter, and very disagreeable to the taste. Notwithstanding this great salinity, all the species of the fish that exist in the Jarkent-darja—*Nemachilus yarkandensis*, *Aspiorrhynchus Przewalskii*, *Schizostorax Biddulphi*, *Diptychus gymnogaster*—are found in these lakes. The lakes are divided amongst the inhabitants of the adjacent villages, each lake having its recognized owners, apart from whom nobody else has any right to fish there.

Then follows an account of the way in which the fish are caught. This description applies to 1890. Since then many inhabitants have given up fishing for agriculture. In the next few pages we shall see what the country looked like ten years later.

The first lake is the Teis-köl, which differs from its sister lakes in not being immediately surrounded by desert sand. Above this there are said to exist two depressions, Ettek-bajir and Kaltschini-bajiri, though neither contains water. Thus the first real desert lake is the Tus-alghutsch-köl, connected with the river by a canal (dry on 7th December), which winds through the reed-beds and has a hut beside it. This lake is said to be now kept cut off from the river, even at the time of high flood, owing to its mouth having been stopped up with branches, brushwood, and clay. The fish which are imprisoned in it are said to become fatter and to acquire a better flavour after the water has in great part evaporated, and the rest of it thus becomes slightly salt. In the winter the fish are taken in nets let down through holes hewn in the ice, the fish being driven into them by the men stamping and jumping on the frozen surface of the lake. In the summer the fish are caught from canoes. The lake, which is entirely surrounded by high barren sand-dunes, is said to attain a depth of three fathoms (kulatsch—the distance between the finger-tips when the arms are stretched out at full length). Nine families who formerly dwelt on its shores abandoned their huts in 1892 and flitted over to the

* 1 saschen (sagena) = 7 feet. 1 verst = 3,500 feet.

left bank of the Tarim in order to carry on agriculture. The name Tus-alghutsch-köl conveys implicitly an indirect explanation: it means the Lake whence People Fetch Salt. Possibly its shores are saliferous. In area the lake is very small, and on 7th December it was entirely frozen over.

The next lake is the Sejt-köl, connected with the river by three canals (utschu or aghsi), now stopped up. All three canals have forced their way through the sand-dunes, though the immediate banks of the middle one and the lowest are quite flat and overgrown with reeds. The lowest, when open, turns a mill. The northern portion of the lake lies for some distance parallel with the river, and so close to it that the two upper canals are each only a couple of hundred meters long. But, as was well seen from the top of the dunes, not far short of 100 m. high, on the east shore of the Sejt-köl itself, the larger portion of the lake extends S. 27° W., and resembles a fiord penetrating between mountains of sand. A long way off was observed a *bughas* (neck or contraction) between two projecting headlands, and beyond that a fresh expansion terminated towards the south by relatively low sand-dunes.

Strange to say, the natives everywhere asserted that the lakes are "artificially made." According to them, long, long ago canals were dug, and these were widened by the high flood-water, and in this way the depressions, which already existed among the sand-dunes, became gradually filled; and in part the sand was even thrust back by the encroaching water. This simple explanation can, of course, only be partially correct. That the depressions have not been artificially made is perfectly self-evident; they existed, indeed, before the Tarim ever flowed through that part of the country. That they have been filled and are kept filled with water from the Tarim is equally clear, and will shortly be sufficiently proved on the basis of exact measurement. On the other hand, it is not likely that all these connecting channels have been made by human agency; it is more likely that the river, by shifting to the right, and in consequence of its overflowing, has carved paths for itself into the depressions. But of this more later on.

At the foot of the vast accumulation of sand on the east shore of Sejt-köl there is a village of the same name, but its huts, built of poles and reeds towards the end of the seventies, now stand empty and deserted. The twenty-three families who inhabited them flitted, like the twenty-five families of Teis-köl, to Ak-tarma, on the great highway, in 1892. The reason of their changing their

habitation was an outbreak of smallpox (tschätschäk), which raged in this district and decimated the inhabitants. The same visitation having ravaged all the villages alongside these lakes, the survivors were ordered by the Chinese authorities to flit over to the left bank of the river and devote themselves to agriculture, especially the growing of wheat, and to pastoral pursuits, more particularly the breeding of sheep. Previous to that time they had lived almost entirely upon a fish diet and by fishing. The soil does not, however, appear to be very favourable for cultivation, and the harvest does not yield sufficient for the people's needs. This is indeed strange, for one would think that in this locality of all others the irrigation of the fields would not be attended with any special difficulties.

Although a few well-to-do families own as many as 1,000 sheep, most of them possess barely 100 each. As a rule, they have to procure part of their supplies of flour from Korla, purchasing it by the barter of their sheep. The deserted villages are not occupied, even in summer; the people, who are few in number, are still afraid of infection, although they are said to have been vaccinated by the authorities. When the former villagers visit the lakes for the fishing in the summer they prefer to spend their nights in the open air; for fish still continues to form an essential part of their food—indeed, without it they could not exist. The inhabitants of the whole of this region call themselves Loplik—*i.e.*, people from Lop, just as the inhabitants of Kaschgar and Tschertschen call themselves respectively Kaschgarlik and Tschertschenlik. It is precisely in this region that the ancient name of Lop has ineradicably rooted itself.

Generally speaking, the dunes do not advance right up to the shores of the Sejt-köl, but are separated from them by a narrow strip of ground overgrown with reeds and tamarisks, with an occasional poplar. Thus the ground upon which the dunes stand lies somewhat higher than the level of the lake, though, on the other hand, it is to be noted that the lake has been shrinking and its *niveau* falling since its feeding-canals have been closed. Although the depth is said to reach 4 fathoms, it is, as a rule, much less. In the northern part of the lake there are some small sandy islands. The lake was frozen over from end to end, but it was only along the shores that the ice bore. The northeastern shore of Sejt-köl was studded with a great number of small, shallow pools. To ride from one end of the lake to the other took a horseman who was sent there at a later date an hour and a half of hard riding. Be-

yond and in the line of the lake's south-southwest continuation he discovered three depressions, separated from one another by "thresholds" of sand. * * *

For the sake of clearness it is well to gather up the principal results to which the above inquiry has led.

Between Karaul and Basch-arghan there is a chain of lakes, at least 35 in number.

They are fed by the Tarim through connecting channels.

Consequently they possess fresh water, which becomes slightly brackish when their connection with the river is severed, but is, owing to its stationary condition, as clear as crystal.

Their existence proves that the strip of land along the right bank of the Tarim lies at a lower level than the river.

Each lake occupies an independent depression lying between two elongated dunes.

Each of these depressions is deepest in its southeast part, and has a deep trench along the leeward slope of the dune on its eastern shore.

The western and northern parts of each lake are shallow.

The farther down the river the lakes lie, the greater grows their maximum depth, but the less their mean depth.

As a rule, the breadth increases, and the length decreases, the farther the lakes lie down the river. The proportion of length to maximum breadth is 8.0 : 1 in the Basch-köl and 2.8 : 1 in the Begelik-köl.

In three lakes that were sufficiently measured, the volume increased the farther the lake lay down the river. This is, however, an apparent law merely, and is simply due to the lakes selected. If we take the mean depth of the Jangi-köl as equal to that of the Karaunelik-köl, its capacity will be 120 million cubic meters.

The sides of each lake-basin are cemented by matter partly of fluvial, partly of æolian origin.

Beyond the inner—that is to say, the south-southwest—end of each lake, there is a bajir or depression exhibiting the same characteristics as the lake-basin itself, except that it contains no water. If there is water, the depression is called daschi, or "salt-pool."

The size of the connecting channels is proportional to that of the lake. Sometimes there are two, and even three canals. The length of the canals which feed the lower lakes appears to be greater than the length of those which feed the upper lakes.

All the lakes receive an inflow of water at the periods of high water, unless their canals are dammed by the natives or the lakes are isolated by a change in the course of the river.

In their topography the lakes reproduce the contours partly of the adjacent sandy desert, partly of the substratum.

The depressions were originally caused by wind-erosion, and their situation in the trenches of the substratum—*i. e.*, the everywhere predominant direction of their major axis from north-northeast to south-southwest, was originally caused by the prevalent wind blowing more or less at right angles to the main axis of the dunes.

Several of the lakes are contracted and narrow in the middle—a result attributable to the festoon arrangement of the dune-chains.

The lakes are of no great age, because the river itself has not long flowed through that region.

On both sides of each lake, east as well as west, there is generally a narrow strip of vegetation—the former owing its existence to the protection it enjoys against the wind, the latter to the wide berth afforded in consequence of the drift sand having been blown away by the wind, so that it does not smother the vegetation. This vegetation has been brought to these regions, which formerly were absolutely sterile, by the waters of the Tarim.

The lakes are full of fish, and fishing is carried on in several of them, though, since the natives have devoted themselves to agriculture, not to the same extent as formerly.

The highest dune I measured in this region had an altitude of 89.5 m. and the greatest depth sounded amounted to 14.0 m. (at Markat). Thus the greatest vertical difference of elevation is 103.5 m.—in fact, this was the greatest vertical difference of elevation I measured throughout the Lop country. It is, of course, possible there may be an even greater depth locally in one or other of the lakes, and that one or other of the dunes may stand a little higher, but the difference will in no case exceed a couple of meters or so above the 103 m.

As regards the future of these lakes, it may be taken for granted that they are doomed to perish, either through the advance of the dunes or the instability of the river. Their existence is in any case precarious, and represents merely a passing phase in the history of the development of the lower Tarim.

If through any cause they should disappear, it would result in an increase in the extent and volume of the Kara-Koschun. Their enlargement, being a consequence of the raising of the river-bed, has resulted in the diminution of the area of the Kara-koschun during the period in which it has been subject to observation.

THE OPPORTUNITY FOR THE ASSOCIATION OF AMERICAN GEOGRAPHERS.

An Address by W. M. Davis at the First Meeting of the Association in Philadelphia, December 29, 1904.

The segregation of specialists into societies of national membership, but of limited scope, has been a noticeable feature of scientific development among us in the last ten or twenty years. The profitable results are apparent to all who have attended the many successful meetings that the various societies have held; the unprofitable results have been little discussed. While on the whole the latter are not of great importance, they certainly deserve consideration when it is proposed to form yet another society of specialists. The chief of them are: the interference with other interests caused by the multiplication of meetings devoted to single sciences, the narrowing influence of withdrawal from more general discussions, and the cost of yet another annual fee. These considerations have not been overlooked by those who have decided to form an Association of American Geographers; their decision was taken because it was felt that, as far as the above considerations are concerned, much more would be gained than would be lost by establishing such an association. But there are other difficulties attending our particular case. Geography as a subject of mature study has little recognition in this country. Most of those who give their mature years to its cultivation devote their efforts to such of its elements as can be apprehended by young pupils. Most of the other mature students of geography are also occupied with associated sciences, such as geology, biology, or history. Indeed, geography broadens greatly as it matures, and some critics fear that it lacks the coherence essential to a science that is to hold a society together. It is not to be denied that this is a serious embarrassment; yet even when the other difficulties are added thereto, they do not outweigh the advantages that it is hoped and believed may be gained by organization; and it is particularly to the means of reaching these advantages that I wish to devote a few minutes of our first meeting.

In the first place, we may fairly hope, from the success that has already attended the efforts of the Committee on Organization, to bring together a large majority of the investigating geographers of

the United States—indeed, of North America. If we are really successful in thus associating the students of the organic and inorganic sides, the human, economic, zoological, botanical, climatic, oceanographic, and geologic sides of geography, and in leading them to work in view of and in co-operation with each other, and to present their results in each other's presence, we shall have taken an important step in the development of geographical science; for it cannot be doubted that students on the different sides of our subject have as a rule lived too far apart. If we can bring them together, we shall do much towards establishing a higher standard for mature geography, by making a better knowledge of its many sides essential.

While we propose limitation of membership to those who have done original work in some branch of geography, it is not the wish of the organizing committee to make our meetings exclusive, but rather to welcome to them all interested persons, and particularly those who by further work hope to take membership with us. The encouragement that we may give to these younger students to persevere in the cultivation of truly geographical science will, I trust, not be the least useful duty of our Association.

In both of these efforts we wish to occupy as truly a national position as any of the other national scientific societies—such as the Geological Society of America, or the American Physical Society. We shall have no fixed home; no limitations as to residence of members or officers, or as to place or time of meetings. At the same time we wish to establish the most cordial relations with all American geographical societies. We shall respect the pronounced individuality of the existing societies and promote the developing initiative of new ones. We shall hope to gain close acquaintance with them, not only by inviting their more active investigators to take membership in our Association, but also by asking their hospitality from time to time in allowing us to meet in their rooms. We do not propose to enter into competition with the existing societies in the way of publication. Most naturally, therefore, we wish geographical societies to increase in number and strength all over the country. While our membership must remain comparatively small—we may not reach a hundred for some time to come—nothing will give us more satisfaction than to see the more popular membership in the general geographical societies roll up to many thousands.

Our activities will not be limited to meetings for reading papers indoors. We hope not only to hold field meetings in the open

season, but also to do our utmost in promoting geographical investigation and geographical progress of all kinds. There is plenty of work to be done. It goes without saying, however, that members and officers alike will have to give time and thought and effort if significant results of these kinds are to be reached. In my own judgment, our success will be measured chiefly by the amount of geographical activity that comes to be associated with our meetings. The reading of papers is one indication of such activity; but it is not the only one, and perhaps not the most important one.

In the midst of great diversity of interests, and of active competition with societies in other subjects, there are, on the one hand, evident difficulties before us. We hope, on the other hand, to bring prominently forward the geographical element in all our work here presented, in order to strengthen the bond that draws us together; and we must, if possible, arrange the time and place of our meetings so that the other interests of many of our members shall not suffer. The Council of the Association will ask the best suggestions of all members toward these ends.

We have one great encouragement. A year ago we were only an imaginary quantity. Now we have taken form; we have already an enviable list of members, a good programme for our first meeting, and a representative, if not a large attendance. A great opportunity for useful work is before us; we have only to press forward to reach it. Let us press forward together!

CIRQUES: A REVIEW.

BY

ROBERT MARSHALL BROWN.

Description. Cirques have been described as crescent-shaped hollows or half-cauldrons on the sides of mountains (Geikie, A., 1887, 157), as large spaces excavated from the solid rock, bounded on three sides by an almost cylindrical steep mountain wall, and with a tolerably flat floor (Helland, 1877, 161); armchair-like recesses in mountain sides (Richter, 1900, 103).

The essentials are the steep sloping sides, the embayment in a mountain slope, the exit facing the valley, with a sill generally above the level of the floor of the cirque, and the sharply-cut remnants of mountains where cirques have been numerous, shading to the more normal form of mountains in unglaciated regions where this feature has been less common. The variations of cirques

depend on the differences of rock structure as well as the accidents of the agents of modelling. The shape and size depend upon the resistancy of the rock. Every rock has its own peculiar type. Weathering may have softened the rugged outline, if the time since the last vestige of ice was melted has been sufficient. The sill may be of rock, a remnant of a less efficient erosion, or of morainal matter. The basin itself may contain a lake, if time has not been long enough to allow a complete breaching of the sill. Talus, from the cliff walls, tends to fill up the basin, and aids in its way in obliterating the lake or tarn.

Name: Custom has not yet made a decision as to the universal name of this feature of mountain sculpture. Many countries furnish their own local names, and the word has been parenthetically translated into three or four languages, when the form is mentioned —thus, corries (Cirques, Karen, Botner). In the Scottish Highlands, corry is the prevailing word; in Wales, cwm; in Norway, botn; in the Alps, kar; while the French-Swiss supply the name cirque. Cliffed amphitheatre is less commonly applied to the true cirque type. This last name is reserved for a similar form of a somewhat different origin.

Localities: Cirques have been described from nearly all mountainous countries. Those of Scotland, Norway, and the Alps have quite monopolized the attention of geologists, mainly because of their prominence, numbers, and accessibility. The Pyrenees offer good examples. The Balkan Peninsula, the Himalayas, Greenland, and our own Western mountains furnish a number of features.

Theories: A theory of the origin of cirques was early published (Forbes, 259), in which they were described as craters of upheaval. The diversity and character of the rocks in which they occur did not allow this theory to gain strength.

Bonney (1871, 320) considered them pre-glacial, and treated them as the result of streams falling over cliffs. He demanded certain favourable conditions of the ground; upland glens so shaped as to give rise to and maintain many small streams; moderately horizontal strata; strata of such a nature as will allow of the formation of cliffs, the most favourable being thick beds of limestones, with alternating bands of other rock.

A little later cirques were described in the Alps and in the Himalayas. In the latter the ice still occupied them (Drew, 1873, 399). The floor was filled with ice, and the steep sides were covered with accumulations of snow. In the Alps, Gastaldi (1873, 396) was convinced that the cirques were formerly occupied by

glaciers but little anterior to the modern period, and that the ice was well able to excavate for them deep beds in all kinds of rock.

In 1877, Helland (1877, 161), after an extensive study of the cirques of Norway, Scotland, and Greenland, stated that they were connected with glacial invasions. Furthermore, he considered that their position had some relation to the line of perpetual snow. As in Norway, cirques were found to be numerous in regions of small isolated glaciers; and as the limit of the snow is most favourable for the formation of such glaciers, the relation is a consistent one. While Helland placed the line of perpetual snow as a prominent seat of corry construction, he fairly stated that, inasmuch as it is in accord with glacial laws that glaciers flow much below the snow limit, so cirques will exist below; and, on the other hand, retreating ice will place cirques at higher levels.

A. Geikie (1887, 165) deemed that the formation of cirques was due to torrential streams, converging towards a mountain chasm. Frost was considered a powerful factor in the process, while snow and glacier ice was admitted as a not less powerful source of aid in the work.

J. Geikie (1895, 236) made a distinction between cirques of non-glacial origin and those of glacial origin. While many valleys headed in cirques before the ice invasion and in countries with no glacial record cirques appeared, they did not, however, exhibit the basin-like bottom nor cliff wall which characterizes cirques of glacial origin. He considered that many of the glacial cirques were born of non-glacial cirques. These non-glacial amphitheatres served as channels, and the ice, concentrating its erosion, scoured out a basin.

Johnson (1899, 112) explains the recession of the cirque walls by a process which he calls sapping. A glacier scours its valley downwards and outwards because of the direction of ice advance and the weight of the mass. The sapping process, on the other hand, is backward and horizontal. Where crevasses which extend to the base occur in a glacier, the rock is exposed to excessive weathering by frost agencies. The greater part of this action is probably the result of a diurnal change of temperature during certain seasons of the year. There is then a disrupting of the rocky base, a new position of crevasses posterior to the first location, and a gradual recession of the cliff walls as the process repeats itself. The glacier makes the cirque, in the first place, by this process, and then, by continual occupancy, enlarges it. The final result of the erosive action is to subdue the mountain.

Matthes (1899–1900, 173) considers a cirque as a modified pre-glacial stream-worn valley whose V-shaped cross section has been converted into a wider U-shaped one, and whose grade has been flattened rather than lowered. In order to have a typical cirque, he insists that the pre-glacial valleys must be far enough apart, so that the recession will not cause a coalescence of such valleys, that there must be no subsequent sculpturing by remnant glaciers on the crests of the mountains, that the rock be homogeneous, and that there be no post-glacial remodelling by weathering or erosion. Matthes agrees with Johnson so far as to state that the cirque is essentially the product of a crevasse, and that if it were not for the opening which allows the outside air to reach the foot of the cirque wall the latter would have no tendency to recede, and therefore, no cirque would be formed.

De Martonne (1901, 10) considered that cirques are as evident indications of glacial action as roches moutonnées and striæ.

Davis (1901, 305) connected the formation of cirques with local glaciers—the dwindling tributaries of the greater glacial streams. The sill and the basin floor are not consistent with an actively-flowing stream. While the greater part of the work of deepening and widening a cirque may be done during the tributary stage of a glacial head stream, the final touch must depend on the remnant of the stream left in the cirque. The length of time during which this local stream works will determine the completeness of the basin. That the cirque should possess a sill and a rock basin is the result of differential work of the local glacier. At the terminus of the ice stream, the disappearing ice will do little work. Back from the melting front, erosive power must increase for a time because the thickness of the ice increases. The maximum point is soon reached, and a decrease begins as one passes towards the névé fields. This position of maximum erosive power in a glacier limited to a cirque is sufficient, in time, to yield the basin. When the local glacier was a part of the larger stream—taking the condition of the cirque glacier as the remnant of a more extensive flow—the maximum would be located in respect to the entire stream, and no basin would be possible in the head branches unless resistant rocks were encountered.

River Amphitheatres and Cirques: River amphitheatres are formed as in the Colorado River, where the head waters come in in all directions, and where the action of the water on the rocks is equal on all sides. In glacial-formed cirques, the retreat of the ice over the sill has worn the bottom of the basin deeper than the outlet,

and abandoned cirques often hold lakes. River amphitheatres, on the other hand, must always be open to drainage, inasmuch as they are stream-made. In rivers, if the head of drainage is not reached, no amphitheatre will be formed; but the river will cut back, forming a cañon narrowing upwards towards the source. The conditions necessary for the formation of a river amphitheatre are numerous and fairly exact, so that such features in rivers are uncommon. Bonney's conditions of cirque-formation, above mentioned, might well find a place here. Cirques are too common a feature of mountains, and too independent of rock structure, to have been reared under such limitations.

The term valley cirque has been applied to the long glen into which the cirque proper opens. They are the result of the erosion of the trunk stream, and generally show features similar to those of the mountain basin. They represent the work of the ice previous to the more local habitations in the mountain sides.

Special Features: The interior of a cirque shows a breaking of the rock, not the smooth wearing that would be expected. The rather jagged interior suggests strong action, and is very likely associated with the temperature, which must hover about the freezing-point. The melting of the ice filling the cracks of the rock with water and a subsequent freezing would account for this. Simple water action alone could not produce such a form. In a retreating glacier occupying a cirque the alternating melting and freezing must be diurnal for a considerable season.

The outlines of most of the highest mountains are due to cirques. Richter (1900, 103) goes so far as to say that the Alps would show the rounded form of subdued mountains to-day if they had not been invaded by ice. The steep cliff-like walls of neighbouring cirques meeting in a sharp edge often yield arêtes or fish-back ridges. Three cirques coming together form a drei-kanter, as in the Matterhorn. The rounded form of Mont Blanc seems to have been singularly free from such invasion. Much of the Alpine region shows the sharply-serrate forms. This may be applied with almost equal force to Big Horn Mountains, to Norway, to Scotland, and, in fact, to all glaciated mountainous regions. It has been pointed out, moreover, that as in the Alps passing from west to east cirques occur at higher and higher levels, we may use this as evidence that the snow-line of glacial times gradually rose to higher levels as it passed from west to east into the interior.

An interesting case of glacial capture is instanced by Matthes (1900, 167–190). In the Big Horn Mountains two cirques are so

situated that one seems to overlap the other. The present drainage from one turns sharply and passes through the other. The slope of the latter is steeper than the slope of the former, and the suggestion arises that the latter encroached upon the field of the former and effected a capture of its drainage.

LITERATURE.

Bonney, 1871.—On the formation of cirques and their bearing upon theories attributing the excavation of Alpine valleys mainly to the action of ice.—(*Quart. Journ. Geol. Soc.*, XXVII, 1871, 312–324.)

Davis, 1901.—Glacial erosion in France, Switzerland and Norway.—(*Proc. Bos. Soc. Nat. Hist.*, 29, 273–322.)

Drew, 1873.—Glacial erosion.—(*Quart. Journ. Geol. Soc.*, XXIX, 399.)

Forbes.—Norway and its glaciers, 259.

Gastaldi, 1873.—On the effect of glacial erosion in Alpine valleys.—(*Quart. Journ. Geol. Soc.*, XXIX, 396–399.)

Geikie, A., 1887.—Scenery of Scotland, 2d ed., pp. 157, 165.

Geikie, J., 1895.—The Great Ice Age, 3rd ed., pp. 236–237, 251, 520, 574, 588, 595.

Helland Amund, 1877.—On the ice-fiords of North Greenland and on the formation of fiords, lakes and cirques in Norway and Greenland.—(*Quart. Journ. Geol. Soc.*, XXXIII, 161 et seq.)

Johnson, W. D., 1899.—Work of glaciers in high mountains.—(Science, N. S., IX, 112.)

Matthes, 1900.—Glacial Sculpture of Big Horn Mountains. (21 Ann. Rep. U. S. G. S., Pt. II, 167–190.)

De Martonne, 1901.—Sur la Formation des Cirques.—(Ann. de Géogr., X, 1901, 10–16.)

Richter, E., 1900.—Geomorphologische Untersuchungen in den Hoch Alpen.—(Pet. Mitt. Erg'heft, 132, 103.)

WORCESTER, MASS.

A RÉSUMÉ OF THE GEOGRAPHICAL DISTRIBUTION OF THE DISCOGLOSSOID TOADS IN THE LIGHT OF ANCIENT LAND CONNECTIONS.*

BY

LEONHARD STEJNEGER,

of the United States National Museum.

The discoglossoid toads form a small, compact group of five recent genera remarkable for their primitive structure and for their extraordinarily disconnected distribution. One genus, *Liopelma*, is the only batrachian found in New Zealand. Another genus,

* A paper read before the Association of American Geographers in Philadelphia, December 29, 1904.

Ascaphus, is only known from a single specimen obtained a few years ago in the State of Washington not far from the Pacific Coast. The three other genera are inhabitants of the Old World: *Discoglossus*, with one recent species occurring in western North Africa, the western Mediterranean islands and the Pyrenean peninsula; *Alytes*, the celebrated midwife-toad, with two species, one of which is confined to the latter peninsula, while the other extends also through France and western Germany; finally *Bombina*, the bell-toad, with three species, one occupying the Balkan peninsula, the Italian peninsula, and the adjacent mountain regions of Central Europe, extending westward into France, though without reaching Bretagne or the Pyrenees, the other occupying the lowlands to the east and north into Russia, while the third is located thousands of miles away on the opposite side of the Eurasian continent—viz., in north-eastern China, Korea, and the Ussuri country.

This unique and disconnected distribution points to a great antiquity of these animals, and promises to shed some light upon the problem of ancient land connections, as the batrachians, more than any other class of vertebrates, require continuous land for their dispersal.

All indications point towards the country southwest of the Himalayas as the original centre of the radiation of the discoglossoid toads, as well as of their near relations the pelodytoid toads. The former are not now found in this region; but that fact weighs but little in view of *Ascaphus* having remained unknown on this continent till 1899, and thus far known only from a single specimen. The absence of paleontologic evidence is also insignificant when it is remembered that only unidentifiable fragments of toad-like animals have been found on this continent from Jurassic and Tertiary deposits.

The significant fact is the occurrence of *Liopelma* in New Zealand; and as the latter archipelago has not been connected with the great continental landmarks since the end of the Cretaceous, that batrachian must have reached those Antipodal islands before that time. The connection with the Sino-Australian continent must have been an eastern one, as various facts militate against Austrålia proper having been involved.

There is, then, no difficulty in assuming that the ancestor of the North American *Ascaphus* reached the Pacific Coast of North America during the Upper Cretaceous over the landbridge which must then have connected eastern Asia and the western portion of our continent—a bridge the existence of which is attested by so

many facts, and now so universally admitted that it does not detain us here.

The discoglossoids must also have reached Europe shortly after, as we find them recorded (*Discoglossus troschelii*) already in the European Lower Miocene, and it is even possible that they may have been there as early as the Upper Eocene.

If the geologists are right, who insist on the existence of a vast Mediterranean Ocean in the Lower Tertiary separating absolutely Europe from Eastern Asia, none of these early discoglossoids can have reached Western Europe from the East. A direct land connection with North America at that period meets with less difficulty and seems altogether probable. In that case the ancestors of *Discoglossus* and *Alytes* may with certainty be regarded as having come to Europe from America, in favour of which contention their Western distribution may also be cited.

The case of *Bombina* is less easily disposed of, due to the occurrence of one species at the extreme eastern end of Asia separated by thousands of miles from the other two. Of the various theories which might be advanced in order to explain this distribution it seems most reasonable at present to select the one which presupposes a comparatively late immigration of this genus from south-eastern Asia into Europe after a late Miocene land connection had been established—a theory which would account for the failure of these toads to reach Spain on the one side and Japan on the other. This assumption rests upon the negative fact that *Bombina* has not been found fossil in Europe below the Upper Miocene. Should it be found lower, we will have to assume for it an American route, or else that the separation of Europe from Eastern Asia by the Mediterranean Ocean was not so complete or of so long duration as has been generally asserted.

The main significance of the above review is that it shows the discoglossoid toads to conform in all essential points to the ancient land connections sketched so admirably by Dr. Ortmann about two years ago, in his paper on the geographical distribution of the decapod crustaceans. The distribution of these toads—at first sight so extraordinary and puzzling—becomes easy of explanation if the distribution of land and water in time and space has been as suggested to him by the range of the decapods.

SECOND ANTARCTIC VOYAGE OF THE "SCOTIA."

A very interesting account of the second year's work of the Scottish National Antarctic Expedition appears in the *Scottish Geographical Magazine* (Jan., 1905). It will be remembered that at the close of its first year's work the *Scotia* went to Buenos Aires for supplies. On January 21, 1904, the vessel left Buenos Aires for the south on her second journey to Weddell Sea. Besides her own staff, there were on board three Argentine meteorologists sent out by the Argentine Government to man the observatory in Scotia Bay, South Orkneys. These islands were reached on February 14, the Argentine party was left under the leadership of Mr. R. C. Mossman, and on February 22 the *Scotia* started for Weddell Sea.

A southeasterly course was steered to cut between the *Scotia's* two tracks of the previous year. No ice was met till near the Antarctic Circle. Early in March the *Scotia* surpassed her southern record of 1903, and also Ross's farthest south of 1843. No obstacle had been met, though in the previous year impenetrable pack was found in this region.

In 72° 18′ S., 17° 59′ W., a sounding of 1,131 fathoms was obtained. All the depths up to this time have been over 2,600 fathoms. At the same time land was reported ahead. A lofty ice barrier stretching northeast and southwest barred further progress to the south. Close, heavy pack prevented a nearer approach than two miles. This barrier was traced 150 miles to the southwest. In 73° 30′ S., 21° 30′ W., a depth of 159 fathoms was found, the ice barrier being then two and a half miles off. Early on the morning of March 7 the *Scotia* was caught in a northeast blizzard and beset in slush and heavy pack. At the end of two days the gale abated and the party found that the *Scotia* had been driven into a bight of the ice barrier. This was in 74° 1′ S., 22° 0′ W., and the depth here was 161 fathoms two miles from the barrier. The Expedition believed the *Scotia* might be frozen in for the season, and began to make preparations for winter. Emperor penguins were extraordinarily abundant, and many were secured for specimens, as well as for food, in case the party had to winter there. Skuas, terns, Antarctic and snowy petrels were also very abundant, and some seals were seen.

Fortunately, the pack began to break up on March 13, and soon

the *Scotia* was once more afloat and started north. The part of the Antarctic continent which the Expedition had discovered was named "Coats Land" after Mr. James Coats, Jr., and Major Andrew Coats, the two chief subscribers to the Expedition. Concerning this new land Mr. Bruce, the leader of the Expedition, says:

I have been asked by several if I am sure that this great ice barrier was really part of the Antarctic Continent. I have no hesitation in saying "Yes," and my reasons are these: All our soundings between 60° and 70° S. were 2,500 to 2,700 fathoms. In 72° S. they shoaled to about 2,300 fathoms, fifty miles from the barrier. Thirty-five miles from the barrier they shoaled to 1,400 and 1,200 fathoms, and two miles from the barrier to 160 fathoms. This alone should answer the question in the way which I have done. Secondly, from the vertical cliff of ice 100 to 150 feet in height which bordered the ocean the ice rose high inland in undulating slopes and faded away in height and distance into the sky. It was impossible to estimate the height of this field of ice—the true inland ice of Antarctica—but probably it was many thousands of feet. Thirdly, seals and birds, which up till now had been few in numbers, were seen in myriads—penguins, especially emperors, many petrels, and terns swarming in every direction—the inhabitants of the beaches and rocky cliffs of some actual land not very far distant.

It was now the end of the Antarctic summer, and the *Scotia*, therefore, turned northeast towards the "Ross Deep." The water deepened rapidly to over 2,000 fathoms, until after a few days, when a somewhat more easterly course was taken, which brought the vessel into rapidly-shoaling water. In 71° 32′ S., 17° 15′ W., the depth was 1,221 fathoms, which showed that the Expedition was getting to the continental shelf of Antarctica again. As pack was here met, the *Scotia* turned back to the northeast. Trawling in 1,410 fathoms in this region resulted in one of the richest hauls the party had made in Antarctic waters, no less than sixty species of animals being obtained.

On March 23 a sounding of 2,660 fathoms was obtained within one mile of Ross's reported sounding of "4,000 fathoms, no bottom"; so after 60 years this sounding, and with it the hypothetical contours of the South Atlantic based on it, have been obliterated from the map. This implies no disparagement of Ross's splendid work. His error was doubtless due to inadequate sounding apparatus and to a strong undercurrent which the *Scotia* discovered in this region.

Steaming nearly due north up to Gough Island, the expedition discovered comparatively shallow water, under 2,000 fathoms, north of 52° S. This shows an extension of the Mid-Atlantic Ridge to the south of the Tristan Da Cunha group. From 58° S. to 48° the bottom was diatom ooze and hard ground; in 46 and 41° S. samples of globigerina ooze were brought up.

The party landed on Gough Island, and found it clothed in green. Tussock grass and a small stunted tree (*Phylica nitida*) grew in abundance, with ferns and mosses. The fauna and flora

resemble those of Tristan Da Cunha, but probably include several new species; two species of birds new to science found here are now being described. Ruins of huts were on the island, and it was afterwards learned at Cape Town that sealers had spent some months here. The *Scotia* reached Cape Town on May 5th.

The chief scientific results of the *Scotia's* voyage may be briefly summed up. Soundings and the discovery of a southern limit to the sea at Coats Land show that the Weddell Sea is less extensive both in area and depth than had been supposed. Temperature and salinity observations of the water were taken at all depths, samples of the bottom deposits were obtained, and the zoological collections embrace many birds, in addition to seals, fish, and representatives of almost every class of invertebrates, from the surface waters, from intermediate depths, and from the bottom of the ocean. Systematic plankton collections were also made.

At the South Orkneys materials were collected for a detailed map of Laurie Island, which will be published soon; an hourly meteorological record was kept for eleven months, and the record is being continued by the meteorologists stationed there; and, in addition, similar observations were taken by the *Scotia* all the time she was at sea. Magnetic observations were made, the botany and geology were investigated, and an extremely rich shallow water fauna was collected, in addition to many specimens of the seals and of the birds of the locality, with their eggs.

In the South Atlantic a somewhat deeper channel has been found between Falkland Islands and the South Orkneys than was previously supposed to exist. Farther east the ocean's contours were materially changed by the discovery of a large southern extension of the Mid-Atlantic ridge to the south of Gough Island. Physical and biological work was carried out in a hitherto entirely uninvestigated ocean; and on Gough Island a small but representative collection of the fauna, flora, and geology was made for the first time.

The report refers to the large amount of work yet to be done between the Tristan Da Cunha group and South Georgia, of island groups still unexplored, and of additional discoveries to be made of other parts of the Antarctic continent in the Weddell Sea region. The hope is expressed that the work begun by Mr. Bruce will be continued in the near future.

GEOGRAPHICAL RECORD.

AMERICAN GEOGRAPHICAL SOCIETY.

Transactions of the Society, January, 1905.—The Annual Meeting of the Society was held at Mendelssohn Hall, No. 119 West Fortieth Street, on Tuesday, January 24, at 8.30 o'clock P.M.

President Peary in the chair.

The following persons, recommended by the Council, were elected Fellows:

J. Parke Channing.
Henry Parish, Jr.
Arthur E. Stillwell.
George Crile, M.D.
Dr. Titus Munson Coan.
James Morris.
James Jesse Atkinson.
William S. Day.
Joseph Peabody.
Abram S. Post.
Edward L. Rogers.
Clifford S. Griswold.
Charles M. Schott, Jr.
James Mills Peirce.
Samuel Sachs.
Gardiner Sherman.
C. Stuart Gager.
Dr. Richard B. Coutant.
August R. Meyer.
Richard T. Dana.
M. J. Butler.
Mrs. John Wells.
John Byron Goldsborough.
Robert E. Plumb.
Franklin R. Carpenter.
Ralph G. Packard, Jr.
George St. John Sheffield.
Dr. Warren O. Plimpton.
Mrs. John D. Hewletts.
Joshua T. Jones.
Mrs. Bashford Dean.

The Annual Report of the Council was then submitted and read.

New York, Jan'y 12, 1905.

To the American Geographical Society:

The Council respectfully submit the following report for the year 1904:

The number of Fellows on the 1st of January was 1,240. The additions during the year were 108. The losses by death, resignation, etc., were 83, and the total Fellowship on the 31st of December was 1,265, of which number 364 were Life Fellows.

The additions to the Library number 4,293—Periodicals and Pamphlets, 2,944; Books, 742; Maps and Charts, 526; Atlases, 25; Photographs and Prints, 56.

Six regular Meetings of the Society were held:

On the 19th of January Mr. Robert Lansing addressed the Society on the Questions Settled by the Award of the Alaskan Boundary Tribunal;

On the 23d of February the Rev. Putnam Cady delivered an address on the Physical and Historical Geography of the Dead Sea Region;

On the 15th of March Prof. Wm. M. Davis described his Journey in Turkestan;

On the 19th of April Dr. Edmund O. Hovey told the incidents of a Journey in Southern Russia and the Caucasus Mountains;

On the 22d of November Mr. Oscar T. Crosby addressed the Society on a Journey in Turkestan and a Corner of Tibet;

On the 20th of December Mr. Alfred H. Brooks described the Geography and Resources of Alaska.

There have been published in the BULLETIN, besides the Record and the Scientific Notes, twenty-four original papers.

For the condition of the finances reference is respectfully made to the report of the Treasurer, herewith presented.

As indicated in the last Annual Report, the Society acceded to the request of the Managers of the Eighth International Geographic Congress to conduct meetings in New York on the 13th, 14th and 15th of September.

All the foreign representatives were the guests of the Society, which provided their transportation from Washington and their hotel accommodation in New York.

During the three days the Society's house was thrown open to the members of the Congress, and all the General Sessions were held in our Assembly Hall ; but the house being too small to afford space for many simultaneous meetings, appeal was made to the American Museum of Natural History, which, with great generosity, not only offered the use of several rooms for the reading of papers, for reporters, smoking, etc., but invited all the members of the Congress to a luncheon on the 14th of September.

On the evening of September 13 a reception was held in the Society's house, and on the 14th the Society gave a dinner complimentary to the foreign guests at the Hotel Endicott. At the dinner M. Cordier delivered to President Peary the gold medal awarded to him by the Société de Géographie, of Paris.

At the request of the Society an exhibition of rare maps, admirably arranged in chronological order, was freely opened to the Congress by the authorities of the Lenox Library.

The 15th of September was devoted to an excursion on the Hudson River as far as Fishkill, organized and conducted by the Society for the Fellows and the members of the Congress. On the return from Fishkill the party stopped at West Point to accept the hospitality of Brig.-Gen. Mills, Superintendent of the U. S. Military Academy.

The funds of the Society were not drawn upon for the entertainment of the Congress. All expenses growing out of the meetings in New York were paid by voluntary contributions from members of the Council and Fellows of the Society.

In commemoration of the fiftieth anniversary of the incorporation of the Society, a dinner was given at Delmonico's restaurant on the 21st of December.

All of which is respectfully submitted.

HENRY PARISH,
Chairman.

LEVI HOLBROOK,
Secretary.

The report of the Treasurer was then read:

Report of the Treasurer to the American Geographical Society for the year 1904:

GENERAL ACCOUNT:

The Treasurer respectfully reports:

On January 1st there was on hand a cash balance of		$64.58
During the year there have been received for Fellowship Dues, Sales of Publications, Interest on Investments, etc.	$20,238.25	
Mortgage Investment paid off	500.00	
Legacies	3,165.33	23,903.58
		$23,968.16

There have been expended for Salaries, Meetings, Library, Publications, House Expenses, Insurance, Postage, Furniture, etc., etc. $21,367.45

On December 31st there was on hand a cash balance of........... $2,600.71

Respectfully submitted,

WALTER R. T. JONES,

Treasurer.

The Committee charged with the duty of selecting candidates for the offices to be filled made the following report:

NEW YORK, December 8th, 1904.

To the Council of the American Geographical Society:

The Committee appointed to recommend to the Society suitable persons to be elected in January, 1905, to fill vacancies then existing in its offices, respectfully report that they recommend the election of the following-named persons to the offices below designated:

President—ROBERT E. PEARY (Term to expire in 1906).
Vice-President—C. C. TIFFANY (Term to expire in 1908).
Treasurer—WALTER R. T. JONES (Term to expire in 1906).
Domestic Corresponding Secretary—CHANDLER ROBBINS (Term to expire in 1908).
Councillors—GEORGE S. BOWDOIN, CHARLES S. FAIRCHILD, HENRY HOLT, ARCHIBALD D. RUSSELL, HERMAN C. VON POST, (Terms to expire in 1908).

HENRY PARISH,
LEVI HOLBROOK,
F. M. BACON,
Committee.

The above report was read to the Council and approved, and the persons named are recommended to the Society for election.

On motion, duly seconded, Mr. A. A. Raven was authorised to cast the vote of the Society for the persons named, and they were declared duly elected.

President Peary then addressed the Society on the Geographical Work of the World in 1904. Stereopticon views were shown.

On motion, the Society adjourned.

Mr. H. L. Bridgman, who left New York at the end of December, 1904, on a mission to the Congo Free State, writes to President Peary from the Grand Hotel, Khartum, on the 13th of January, as follows:

> The Congo "special" arrived on time this morning, and having hired "boys" and donkeys and purchased outfit, is now ready to leave Sunday afternoon for Lado, 1050 miles by steamer up the Nile, where its real work will begin Jan. 28. I am taking supplies for 56 days, though I shall hope to do the actual marching in less time. I'll try to send back a line from Lado; after that I shall, of course, keep ahead of any letters. . .

AMERICA.

IRRIGATION IN THE UNITED STATES IN 1902.—*Bulletin* 16 of the Census Bureau is devoted to this subject. It describes the wonderful transformation in the past twenty years in many parts of the arid West, where thousands of miles of canals

carry water to more than 8,000,000 acres. This land, at one time a worthless desert, is now annually producing crops worth $100,000,000. A crop-producing area larger than the combined area of Massachusetts and Connecticut has been developed in this once forbidding region. The following facts, showing conditions in 1902, are condensed from Table 1:

	NUMBER OF FARMS IRRIGATED.	NUMBER OF ACRES IRRIGATED.	COST OF SYSTEMS.
Arid States and Territories..... ..	122,156	8,471,641	$77,430,212
Semi-arid States and Territories ...	7,021	403,449	5,105,390
Rice States.....................	4,179	606,199	10,195,992
Humid States..................	680	5,788	588,858
United States..................	134,036	9,487,077	$93.320,452

The average cost per irrigated acre was: arid States and Territories, $9.14; semi-arid States and Territories, $12.65; rice States, $16.82; humid States, $101.74; United States, $9.84.

THE SUBMARINE GREAT CAÑON OF THE HUDSON RIVER.—The paper on this subject, which Dr. J. W. Spencer of Washington read before the American Association for the Advancement of Science in Philadelphia, is printed in the *American Journal of Science* (Jan., 1905). Prof. J. D. Dana was the first to recognize, more than forty years ago, the depression extending from near New York to the border of the Continental shelf which the Coast Survey had brought to light as the submerged channel of the Hudson River, formed when the continent stood at a greater altitude above the sea than it does now. The channel begins about ten miles off Sandy Hook, and extends for 93 statute miles before it plunges into the Cañon. Dr. Spencer describes his investigations and studies and those of Lindenkohl, Upham and others, and presents the following summary of his paper and his conclusion:

In 1885, Prof. A. Lindenkohl discovered the channel suddenly transformed into a canyon near the continental border, reaching to a depth of 2,400 feet below the surface of the submerged plain, which is about 400 feet beneath sea-level. But near the then known mouth there appeared a great bar. In 1897, I pointed out that the channel was traceable to great depths, which is now proved. A sounding was made near the supposed bar, which has proved to be only a measurement, taken on the side of a deep canyon with a precipitous wall. Then, four miles beyond this point, against another lateral bank, a further sounding reaches to 4,800 feet, revealing a canyon 3,800 feet in depth, where the continental shelf is not submerged more than 1,000 feet. High up on the sides, the gorge here is less than two miles wide; but the incision of the outer canyon into the shelf has a breadth of four miles. At its head, the canyon begins in an amphitheatre, having a descent from 330 feet to 1,100 feet in the distance of about a mile. Two more steps of 400 and 500 feet respectively follow. Again, between 27 and 31 miles below its head, there is another great step of 2,000 feet to the depth of 4,800 feet mentioned. And the gradient below is probably by other great steps.

This is just beyond the border of the submarine plain, and shows the canyon with a depth of 3,800 feet. The canyon is double, a second or more sinuous gorge traverses the other. A little farther on is a tributary heading in a cove. At 42 miles the canyon begins to widen into a valley, which at 48 miles has a precipitous wall of 2,000 feet in height. The valley opens into an embayment, or wider valley, which also receives that from the Connecticut, now discovered to a depth of about 6,000 feet for the first time, but without details to describe its form. In cutting through the continental bench, at 3,000–3,500 feet beneath the sea-level, the floor of the canyon is between 6,900 and 7,000 feet below the surface of the ocean. The valley is continuous to a point 71 miles from the head of the gorge, and where it is recognizable at a depth of about 9,000 feet.

The canyon and valley discovered to the depth shown, incising first the level continental shelf (in which it turns twice at right angles), and then coursing down the great continental slope, is now taken as a gauge for measuring a late high continental elevation of the region to the extent of 9,000 feet.

This is following out the lines of Dana, Lindenkohl and other students of the submarine channel, in that they considered it a drowned land valley. I have analysed every other known possible cause of its origin. So great are the probabilities, and so long have these been accepted unquestioned, that very strong proof would be required to modify this view.

The period of the great elevation has been found to coincide with that of the early Pleistocene. Since then there has been a subsidence to somewhat below the present level, followed by a re-elevation of 250 feet as seen in the shallow channels of the shelf. With other minor changes, the region is now sinking at the rate of two feet a century.

This canyon feature at our door corroborates the great changes of level worked out most extensively by Hull of Britain, Nansen of Norway, and myself here and in the West Indies, following methods which the father of geography, Prof. J. P. Lesley, predicted in 1888 " must throw light on the whole subject of elevation and subsidence, as applicable to the entire area of the United States."

Practical Geography in America.—At a meeting of the Geographical Association in England on Jan. 6, a discussion occurred on the teaching of practical geography in schools. Professor Charles R. Dryer, of the State Normal College, Terre Haute, Ind., opening the debate, said that practical geography meant in America laboratory work. This work is not necessarily done in a special room, and, indeed, the best part of it is done out of doors. The study of maps plays a large part in this laboratory work. Contoured topographical maps are also much used, together with raised models illustrating different forms of the earth's surface. Pictures, photographs, and lantern-slides also have a conspicuous place in the school's equipment. The instrumental study of the earth's atmosphere is taken next by the students, who keep records of their own observations for a period of three months. The official weather charts may be obtained daily at every school, and owing to the area covered by them it is possible to follow cyclonic and anti-cyclonic disturbances for several days together, and sometimes to predict in the school itself the arrival at a particular time of an atmospheric disturbance. Field excursions are regarded as the most important part of geographical study.

Finger Lake Region of Western New York.—The westernmost members of the Finger Lakes—Canandaigua, Honeoye, Canadia, Hemlock, and Conesus—are described in a recent paper by Prof. Charles R. Dryer (Bull. Geol. Soc. Amer., Vol. XV, 1904, pp. 449–460). He shows that, like the more eastern members, Seneca, Cayuga, etc., these lakes are in long, narrow, deep and smooth-sided valleys. Some of the tributaries to these lake valleys are in valleys whose bottoms are hanging well above not only the lake bottoms, but even above the lake surface. In this respect, too, there is close resemblance to the conditions in the Cayuga and Seneca basins. One instance is described, that of the Canadia lake valley, in which the valley is hanging at both ends above Hemlock lake. From the evidence thus far discovered Dryer concludes that these valleys, which differ materially from normal stream valleys, are probably due to the erosive power of ice during the glacial period, and that the amount of deepening amounted to at least 400 feet. He states, however, that evidence recently discovered in the Cayuga and Seneca valleys, which opposes the theory of ice erosion, leaves the question of the origin of these peculiar valleys still in doubt. R. S. T.

Retimbering the Pine Lands of Michigan.—Last spring marked the beginning of reforestation work in the Michigan State Forest Reserve in Roscommon County. The plantation work consisted in the setting out of 30,000 white pine trees, 10,000 Scotch pine, and 10,000 Norway spruce. The planting was done at intervals of six feet, the ground being prepared by means of mattocks. Extensive seed beds were prepared for the raising of seedlings to be used in plantation work in 1906. The principal seedlings will be white pine, Norway spruce, and Scotch pine. The

Senior class in Forestry at the University of Michigan assisted in all the work. The people of the State are heartily in favour of the forestry policy now being carried out. —(*Forestry Quarterly*, Vol. II, No. 4.)

HEIGHTS OF MOUNTAINS IN THE CANADIAN ROCKIES.—Mr. A. O. Wheeler says, in *Appalachia* (Vol 10, No. 4), that maps which represent the height of some Canadian mountains as between 15,000 and 17,000 feet above sea-level greatly exaggerate. In 1902 the Rev. James Outram ascended a number of high peaks of the Canadian Rockies, and made observations to ascertain their altitude. Dr. Norman Collie and others from 1892 to 1902 made similar observations. The general result was a decided decrease in the previously-accepted altitude of several of the highest mountains of the main range.

While conducting a topographical survey of the Selkirk Range for the Canadian Government, employing the photo-topographic method, Mr. Wheeler took a number of views from commanding Selkirk peaks, in which Mounts Columbia, Bryce, Lyell, and Forbes were readily identified. He desired to ascertain what degree of reliability might be placed upon the computation of altitudes at the long distances shown in the photographs and so determined the altitude of Chancellor Peak by the method employed in photo-topographic surveys. This altitude had previously been computed by the Topographical Survey from a series of angular readings, and established at 10,780 feet above sea-level. He now computed the height of Chancellor Peak from four views taken at different stations, and the mean result, 10,751 feet, was 29 feet less than that previously established. The result seems to promise altitudes for the four northern peaks that would closely approximate the truth. The results of his computations were these mean altitudes for the four mountains :

Mount	Columbia	12,740	feet,	mean	of four	observations
"	Bryce	11,686	"	"	" six	"
"	Lyell	11,463	"	"	" four	"
"	Forbes	12,075	"	"	" four	"

EXPLORATION OF THE UPPER BASIN OF THE NETCHAKHOH.—The Rev. A. G. Morice, of the Missionary Station on Lake Stuart, British Columbia, has explored the large basin of the Upper Netchakhoh, an affluent of the Fraser River. His map and account of his explorations are printed in the *Bulletin* of the Neuchâtel Geographical Society (XV, 1904). He has rendered geographic service by his careful surveys in this little-known region, which extends between the Rocky Mountains and the coastal chain of the Pacific. A few geographical co-ordinates had been established by the Government, and upon these points Father Morice based the surveys of his itineraries. His numerous determinations of altitudes are the results of barometrical observations carried out at all the principal summits and the most important lakes. A number of soundings were made in most of the lakes visited, and at least one in all of them. Some of the lakes on the plateau or mountains are roughly circular in form and comparatively small, while the lakes of the valleys are much larger and very deep. Lake Morice, for example, is fifty-one miles long, and in this lake the explorer found the greatest depth of water (777 feet).

CUBA'S METEOROLOGICAL JOURNAL.— The Central Meteorological Station at Havana, under the control of the Secretary of Agriculture, Industry, and Commerce, prints a monthly *Boletín*, each number of which contains two charts, one showing the mean temperatures and the predominating winds of the month and the other the distribution and quantity of rainfall. These charts are preceded by a résumé of climatic conditions in the different provinces and monthly tables of meteorological observations.

AFRICA.

THE VICTORIA FALLS.—These falls, in the Zambezi River, about 1,000 miles from the coast, are remarkable for their width, height, and beauty, giving them rank among the greatest of the world's cataracts. Above the cataract the river flows almost on the surface of the plateau, branching in numerous arms between a series of islets. It then tumbles about 400 feet into a chasm and follows a peculiar zig-zag course into a cañon about 40 miles in length. The crest of the falls is not continuous but interrupted by three islands, which divide it into four falls of unequal width, the smallest 36 yards, the largest 573 yards broad. The rock, both at the crest of the falls and in the cañon, is a basalt, horizontally bedded, with some layers slightly less resistant than others, but with scarcely sufficient difference to account for the cataract, or the difference in resistance of the strata as in the case of Niagara.

Livingstone, who first discovered these falls, in 1860, ascribed them to fissuring of the crust, and all subsequent writers have accepted this explanation; but Molyneux, in a recent article (Geog. Journ., Vol. XXV, 1905, pp. 40–55), from which the above facts are taken, states a much more rational explanation, and supports it by a sufficient body of fact to lead to its acceptance. His explanation is that of simple river erosion, working irregularly, owing to the influence of the joint planes by which the basalt is traversed, in some places even to the extent of the development of basaltic columns. Taking advantage of the weakness resulting from areas of abundant joints the water works more rapidly in such places, and causes shifting of the form and position of the falls, which, however, continue to remain vertical, because the joints cleave the rock vertically. It is by following areas of abundant joints that the peculiar zig-zag course of the gorge below the falls is developed, and the author shows quite conclusively that portions of at least some of the zig-zags were the site of former falls during the process of upstream recession, which is still in progress.

Molyneux's discussion, which is illustrated by a map and nine full-page half tones, seems to explain the main features of the Victoria Falls, and, although there are some questions of detail which seem to call for explanation, will doubtless stand the test of future investigation. He makes some comparisons and contrasts with Niagara which the Victoria Falls rival in grandeur, and exceed in size. Had he been familiar with the Shoshone Falls, he would doubtless have found there some opportunities for more striking comparisons, though the Shoshone Falls are mere pigmies beside these giant falls. R. S. T.

ASIA.

EXPLORATION IN WESTERN TIBET.—On the return journey to India of the Tibetan Mission a small party under Captains Ryder and Rawling diverged from the main body for the purpose of ascending the valley of the Sangpo River in a general western direction, with a slight northing towards Gartok. This is one of the three marts to be opened for Indo-Tibetan trade under the provisions of the new treaty. It is 510 miles from Gyangtse, the other nearest Tibetan mart on the east and about 200 miles from Simla on the west. This part of Tibet has been practically unexplored. The party left Gyangtse on Oct. 10, and arrived at Shigatse in three days after a delightful journey through richly-cultivated and highly-irrigated valleys. Villages were dotted thickly over the slopes, every house and hamlet being surrounded with trees. The harvest had been good, and this part of Tibet was prosperous. The party were received in a most friendly manner by the Tibetan officials. Shigatse had not been seen by Europeans since Captain Turner's visit 120 years ago. The British officers describe the neighbouring monastery of Tashi-lhunpo as far finer than anything at Lhasa, its circumference being two miles. The monastery consists of

300 or 400 houses, besides temples and the palace of the Tashi Lama, who is at present, by virtue of the decree of the Emperor of China, the head of all the churches owning the supremacy of the Dalai Lama. The Tashi Lama received the Englishmen cordially. The party continued its long journey through the unexplored region toward Gartok, and the first news of its discoveries will probably come from Simla.

EUROPE.

Depths of the Northern Fiords of Norway.—Last summer Mr. Nordgaard made a series of soundings in the fiords of northern Norway which revealed unexpected depths at the entrances. These soundings along the coast between 67° 15′ and 68° 25′ showed the following results at or just within the mouths of the fiords:

Ofoten fiord, 550 meters; Ősund, 630; Tys fiord, 725; Folden fiord, 530; Skjerstad fiord, 518. In Vest fiord, near Tranö, the soundings ranged from 630 to 680 meters. (*Naturen*, Bergen No. 12, 1904.)

Catalogue of Northern European Fish.—The International Council for the Exploration of the Sea has published in French at Copenhagen (*Publications de Circonstance*, No. 12) a catalogue of the fish observed in waters that are limited on the north by the Arctic Ocean, on the east by Novaya Zemlia, the Kara Sea and the Urals, on the south by the English Channel, and on the west by the east coast of Greenland, and further south by 25 W. Long. A. Günther's classification of fish, as prepared for the British Museum, is used, and not only the scientific names of the various subclasses, orders and families, but also the names by which the fish are known in the languages of North Europe are given. The catalogue also contains information on the nature of the waters that each fish frequents and its geographical distribution.

Atlantic Water in the North Sea.—The part assigned to Scottish hydrographers in the international scheme of Exploration of the Sea during 1903 related largely to the problem of the quantity of Atlantic water which flows in through the channels between Scotland and Shetland, and so enters the North Sea. The results are reported by Dr. A. J. Robertson, of Dundee (*Publications de Circonstance, No. 17*). Along the section from the North of Scotland to the Shetlands widely different conditions were found at the various seasons of the year. In May, 1903, the greater portion of this region was flooded by salt Atlantic water, which by August had greatly decreased in volume; in November very little Atlantic water was found here, and that was of comparatively low salinity. By February, 1904, the inflow into the North Sea had recommenced, but was not then quite so extensive as in May of the previous year. It seems, therefore, that during 1903 the Atlantic inflow underwent a variation with the seasons, with the maximum about March and a minimum about November. This conclusion accords with the surface salinity observations carried out along various routes over the North Sea in this period. While too much importance should not be attached to surface observations considered alone, most of the evidence indicates seasonal variation in the volume of Atlantic water entering the North Sea, the greatest inflow occurring early in the year, probably about March or April.

Post-Glacial Changes of Attitude in the Italian Lakes.—Mr. Frank B. Taylor (Bull. Geol. Soc. Amer., Vol. XV, 1904, pp. 369–378) presents evidence that the levels of Lakes Maggiore, Como, and Garda formerly stood in different attitudes toward the land from that of the present. This evidence is mainly derived from a study of the delta cones of mountain torrents, the lakes being too narrow, the shores too steep, and the rock too hard for the development of continuous shore-line records;

but in the broad, bulb-like southern end of Lago di Garda he found benches backed by cliffs, evidently wave-cut. Taylor's long experience in the study of the shore lines of higher levels of the American Great Lakes leads one to place entire confidence in his conclusions from the studies in the Italian lake valleys. From his observations he draws the conclusion that, as a result of land-tilting, the lake levels of the present are lower in the north than formerly. The surfaces of these lakes sloped to the south about one foot per mile as compared with their present surfaces. R. S. T.

POLAR.

THE ANTARCTIC.—Mr. E. Pariset has written a comprehensive summary of explorations in the Antarctic regions (*Vers la Terre Polaire Australe*, A. Rey, Lyons, France). The book does not contain the results of the voyage of the Scottish expedition in 1904, nor the detailed scientific results of the other recent explorations, which, in fact, are not yet published. With these exceptions it gives in 134 pages a concise and exact résumé of South Polar enterprises. The first chapter treats of the ideas of the Antarctic continent which prevailed previous to the XIXth Century. The author then sums up the work of the many navigators who visited the South Polar regions in that century, and describes the explorations and the scientific results, as far as they are as yet accessible, of the recent Belgian, German, Swedish, English, and Scotch expeditions, and of Mr. Borchgrevink's investigations in Victoria Land. The final chapter generalizes present information concerning glacial phenomena, meteorology, geology, and life in the Antarctic regions, and the book concludes with a bibliography of the most recent expeditions.

THE TEMPERATURE AT THE POLES.—A useful summary of the facts regarding the temperature of the poles, which have resulted from the meteorological work of recent polar expeditions, is given in the *Annales de Géographie* for July 15. A series of charts shows the mean summer and winter temperatures, so far as these are known, for the north and south polar areas. The lower summer temperatures of the Antarctic than of the Arctic are clearly brought out. The difference is ascribed to geographical conditions, the continental mass around the polar basin of the northern hemisphere being well warmed in summer, and this rise of temperature being felt to the vicinity of the pole. In the Antarctic a band of water encloses a mass of land. During the winter this water prevents the polar cold from advancing northwards; while in summer the water cannot warm the Antarctic area, whose mean temperature always remains low.—(*Scot. Geogr. Mag.*, Dec., 1904.) R. DeC. W.

METEOROLOGY IN THE ANTARCTIC.—At the November meeting of the Royal Meteorological Society, in London, Lieutenant Charles Royds, of the *Discovery*, gave an interesting address on *Meteorological Observing in the Antarctic*, which was illustrated with numerous lantern-slides. Lieutenant Royds was the officer specially charged with the meteorological observations during the recent British National Antarctic Expedition. The ship arrived at her winter quarters on February 8, 1902, and as soon as the water in the bay was frozen the meteorological instruments were set up on the ice. This became, to all intents and purposes, a land station in latitude 77° 50′ S., and observations were carried on there from April 17, 1902, until February 15, 1904, when the ice broke up and allowed the ship to go free. The observations were taken every two hours, those from 8 A. M. to 10 P. M. being taken by Lieutenant Royds, and the night observations being divided between the eleven officers and members of the scientific staff, each one taking a night.

The highest temperatures recorded in each year were 39° on December 26, 1902,

and 42°, also on December 26, 1903. The lowest temperature registered during the stay in winter quarters was $-59°.5$ on August 20, 1903, while at Cape Armitage, a mile and a half to the south of the ship, the minimum on the same day was $-64°.6$. The lowest temperature registered at Cape Armitage, however, was $-67°.7$, at noon on July 19, 1902. The heaviest gale was on July 19, 1902, when for ten hours the anemometer gave a velocity of 85 miles an hour. Blizzards were frequent and added considerably to the difficulties of observing, as the drifting snow choked up the instruments and the screens, and also stopped the self-recording instruments. A peculiarity of the blizzards was the invariable rise of temperature; and they always came from the south and southwest.

It has sometimes been supposed that the sun seldom shows itself in the Antarctic regions. Lieutenant Royds, however, said that this was utterly wrong, as day after day there were most glorious clear skies and continuous sunshine. In proof of this he showed a lantern-slide of three cards from the Campbell-Stokes sunshine recorder, which had traces of 24 hours' continuous sunshine. The effect of the sun on the explorers' faces was very marked. During the winter, from living in artificial light, their faces turned yellow and various other colours, but when they went away sledging, and were out in the sunshine for nine or ten hours every day, their faces turned absolutely brown and their lips cracked, while the skin blistered and in many cases their faces became swollen. Lieutenant Royds said that he had never seen such beautiful and striking examples of every sort of cloud as south of the Antarctic circle. Mirages were common, as were haloes and coronæ, some of which were very beautiful and complicated. Auroræ were not uncommon, but they were not so highly coloured nor so brilliant as those seen in the Arctic region. R. DEC. W.

ISOTHERMS AROUND THE SOUTH POLE.—A comparison of the mean annual temperatures at the English, German, and Swedish Antarctic stations during 1902–03 has been made by W. Krebs in a recent paper in *Das Weltall* (Vol. IV, No. 24), with the result that the average decrease of temperature is found to have been 0.9° (0.5° C.) for each degree of latitude. Applying this value to the results obtained by the five stations in operation in the Antarctic region during the years 1898–1903, the writer of the paper above referred to has drawn approximate isotherms between latitudes 50° and 80° S. These isotherms are drawn for each 7.2° (4° C.) as far as 3.2° (−16° C.), which runs near the 70th parallel, between longitudes 60° E. and 60° W. Parts of the isotherm of −4° (−20 C.) are also drawn, reaching nearly to the 80th parallel. This is a considerable extension of our charted knowledge of Antarctic meteorology. R. DEC. W.

COMMERCIAL GEOGRAPHY.

BUSINESS OF THE KAISER WILHELM CANAL IN 1903–1904.—In the fiscal year ending March 31, 1904, 32,038 vessels of a net tonnage of 4,990,287 passed through Kaiser Wilhelm Canal between the North and Baltic Seas. The traffic was 28 vessels and 416,458 tons larger than in the preceding year. The steam vessels numbered 13,943, the sailing vessels 15,341 and the barges and lighters 2,734. Eighty-three per cent. of the vessels and sixty per cent. of the tonnage were under the German flag, the ships of other nations in order of importance being those of Denmark, Sweden, the Netherlands, England, Russia, Norway, Belgium, and France. For the first time the receipts of the canal were greater than its expenses. Most of the sailing vessels, loaded with timber or lumber for Baltic ports, passed through the Danish straits instead of the Kaiser Wilhelm Canal (*Moniteur officiel du Commerce*, Dec. 29, 1904).

The Seal Catch for 1904.—The annual report of the U. S. Secretary of Commerce and Labor, says that during the year ending in August, 1904, 13,128 skins were taken and shipped, of which number 11,132 were obtained on St. Paul Island, and 1,996 on St. George Island. This is a decrease of 6,164 from the number of skins taken in 1903. The decrease was due largely to the reservation of young male seals for breeding purposes and other restrictions upon killing deemed necessary to preserve the life of the seal herd.

An industry pursued incidentally with that of sealing on the Pribilof Islands is that of raising the Blue Fox for its pelt. These animals are fed and cared for as if domesticated. Last winter 471 skins were taken on St. George Island. The proceeds of the skins are applied to the support of the native inhabitants, whose services are utilized in the taking and curing of the pelts.

New Port on the Red Sea.—Mr. Corbett, the Financial Adviser of the Egyptian Government, said in his note on the Budget for 1905, that the Suakin-Atbara railroad is being built as rapidly as possible, and that it is hoped to complete it early in 1906. The sum of £E.150,000 has been set apart for the creation of a maritime terminus for the railroad at Sheikh el Barghout, some 30 miles to the north of Suakin. The new port, the official name of which has not yet been selected, has the great advantage over Suakin of possessing a commodious harbour, easily accessible to ships of heavy draft.

GENERAL.

Geologic Expression in Contour Maps.—A paper with this title was prepared by Mr. N. H. Darton of the U. S. Geological Survey for the meeting of the Association of American Geographers at Philadelphia. It was mainly descriptive of a text-book now in preparation by the author, describing the development of earth forms and their representation on topographic maps. It is a widely-recognized fact that a knowledge of the geologic conditions under which topographic features are developed is an important aid to the topographer in preparing expressive maps, especially where sketching preponderates over the precise instrumental determination of details. For example, a topographer mapping a drift-covered district should know the conditions under which the characteristic drift topography was developed, in order readily to pick out the salient features and give them proper expression and prominence.

Again, in a region such as the Grand Cañon of the Colorado, where the strata lie nearly horizontal and there are widespread beds of harder and softer rocks in alternating series, a map made without proper understanding of the continuity of the hard bench-making layers and the softer strata that form the talus slopes, would be lacking in expression and not likely to give precise fit when geologic boundaries are added. The topographer who has appreciation of the geology would at once provide for the slight but important differences which arise when the beds cease to be horizontal and have even a slight dip; he will note also important distinctions between the cliffs due to limestone and those due to sandstone. Along many other lines, such as lake shores, glacial erosion in the high mountains, and volcanic products, the topographer understanding the principles of the physical development of these forms, can and does produce more expressive maps, and does so with greater economy than the conscientious sketcher whose method is purely mechanical.

The Influence of Caverns on Topography.—Prof. Russell (Science, Vol. XXI, 1905, pp. 30–32) has made an exceedingly interesting suggestion concerning a possible influence of caverns on topography, which, so far as the writer knows, is a

new point of possible important significance. While limestones, being usually weak rocks, have commonly been worn down to form valleys between the strata of more resistant nature, there are some instances in which limestones stand up prominently above the surrounding strata. The two cases which he especially mentions are those of the rock of Gibraltar and Mackinac Island in Lake Huron. Russell calls attention to the fact that near Luray, Virginia, there is a low limestone hill, with extensive caverns beneath it, which has been left in relief because so honeycombed with caverns that the rain readily percolated into it, thus preventing the formation of surface streams.

On the surrounding land surface streams were able to gather and mechanically erode, thus lowering the surface. The same explanation is proposed as an hypothesis to account for the presence of the elevations at Mackinac Island and Gibraltar. It will be interesting to apply this explanation to these and other instances and see whether it accounts for all the facts, for if it does we have here a new principle in explanation of topographic forms which will be of far wider application than to the exceptional instances discussed. R. S. T.

U. S. Board on Geographic Names. Decisions December 7, 1904, January 4 and February 1, 1905:

Ashnola: river, Okanogan county, Washington (and B. C., Canada; crosses boundary at 120° 20′). (Not Na-is-nu-loh, Ashtnulon, Naisnuloh, Nais-nu-loh, Naisnulho, nor Ashanola.)

Bear Lodge: mountains: Crook county, Wyoming. (Not Bearlodge.)

Cakepoulin: creek, Franklin twp., Hunterdon county, New Jersey. (Not Cakepaulins.)

Central City: town (P. O., R. R. station, and county seat) Gilpin county, Colorado. (Not Central.)

Chewack: creek, tributary of Methow River (from the north, mouth at Winthrop), Okanogan county, Washington. (Not Che-wuch Creek, Chewach Creek, Chewak Creek, Chiwak, Chewach, Chewuck, nor North Fork.)

Conconully: lake, Okanogan county, Washington. (Not Salmon.)

* Egg: island near easternmost point of Unalaska, eastern Aleutians, Alaska. (Not Ugalgan nor Ugalgal.)*

Ellemeham: mountain, Okanogan county, Washington. (Not Ellemachun, Ellomachan, nor Mt. Ellemeham.)

* English: bay indenting the eastern shore of Unalaska island, eastern Aleutians, Alaska. (Not Samganuda.)*

Fraser: river, tributary from south to Grand River, P. O., and Precinct, Grand county, Colorado. (Not Frazier nor Frazer.)

Indian: creek, tributary from south to Bear creek, Clear Creek county, Colorado. (Not South Fork Bear Creek, Roeder, nor Yankee.)

Lake Clear: lake or pond in Harrietstown, Franklin county, New York. (Not Big Clear Pond nor Clear Pond.)

Latah: creek, Spokane and Whitman counties, Washington, and Kootenai county, Idaho, tributary from S. E. to Spokane River at Spokane. (Not Hangman, Hangmans, Latah and Hangman's, Latah and Hangman, Lau-taw, nor Camas Prairie.)

* North Head: cape, the northern point of Akutan island, eastern Aleutians Alaska. (Not Sigak.)*

* Revision of previous decision.

OLD BALDY: peak in the Santa Rita Mountains, Santa Cruz county, Arizona. (Not Baldy, Mt. Wrightson, nor Santa Rita.)

QUENESKA: island in Shelburne town, off Shelburne Point, in Lake Champlain, Vermont. (Not Hog, Whites, nor White's.)

REED: P. O. and R. R. station, Henderson county, Kentucky. (Not Reads.)

RILLITO: creek, four miles north of Tucson, Pima county, Arizona. (Not Rita.)

ROLLINS: pass, over Front Range (Continental Divide), lat. 39° 56′, Boulder and Grand counties, Colorado. (Not Boulder nor Rogers.)

*ROOTOK: island near west end of Aratanak island, Krenitzin group, eastern Aleutians, Alaska. (Not Aektok nor Root*a*k.)*

SALMON: creek, tributary from the north to Okanogan River, Okanogan county, Washington. (Not Conconully, Conc*u*nully, nor White Salmon.)

SAN ANTONIO: creek or river emptying into the Pacific Ocean three miles north of Purisima Pt., Santa Barbara county, California. (Not Jesus Maria River, Guaymas River, nor Los Alamos.)

SIMON: pond, town of Altamont, Franklin county, New York. (Not Simons, Big Simon, Big Simons, Simonds, nor Big Simonds.)

SINLAHEKIN: creek, tributary from the south to Palmer lake, Okanogan county, Washington. (Not Sinlehekin, Sinlahekim, Waring-Sinlehegan, Waring, Toudes Coulé, nor Sinlahegan.)

SUNSET: island, Colchester town, in Lake Champlain, Vermont. (Not Hog Back.)

VALDEZ: glacier, narrows, port, summit, and town, Prince William sound, Alaska. (Not Valdes.)

VANCE: creek, tributary from north to Bear creek, Clear Creek county, Colorado. (Not Little Bear.)

WHALEBONE: cape between Usof and Three Island bays, on south coast of Unalaska, Alaska.

BERGENFIELD: borough, P. O., and R. R. station, Bergen county, N. J. (Not Bergenfields nor Bergen Fields.)

BRUSTER: town and P. O. on the Columbia river, Okanogan county, Wash. (Not Brewster.)

CHILIWIST: creek, tributary from the N. W. to the Okanogan river, Okanogan county, Wash. (Not Chilliwist, Chiliwhist, Chilliwhist, nor Chilowist.)

ECORSE: river, township, P. O., and R. R. station, Wayne county, Mich. (Not Ecorce, River aux Ecorces, nor Ecorces.)

ESTY: glen, north of Ithaca, N. Y. (Not Estey.)

FACTORY: creek in Wayne and Lawrence counties, Tenn. (Not Factory's, Factor's, nor Factors.)

FALSE BOTTOM: creek in Lawrence and Butte counties, S. D. (Not Falsebottom.)

INDIAN: creek in Wayne and Hardin counties, Tenn. (Not Reinness, Reinse's, nor Reinses.)

KOUGAROK: river, tributary to the Kuzitrin river; mountain; mining district; and mining town; Seward Peninsula, Alaska. (Not Kugruk, Koogrock, Kougrok, Kugrock, nor Kugruk City.)

KUGRUK: river, flowing into Kotzebue Sound, just east of Cape Deceit, Alaska. (Not Swan.)

KUGRUPAGA: river, Seward Peninsula, Alaska, flowing into the Arctic Ocean, at Long. 166° 45′. (Not Kugruk nor Koogrook.)

LOUP LOUP: creek, tributary to the Okanogan river, near Malott, Okanogan county, Wash. (Not Loop Loop, Loop-Loop, nor Looploop.)

---

* Revision of previous decision.

PALISADES: township, Bergen County, N. J. (Not Palisade.)

ROGERS: island in Hudson river, Columbia county, N. Y. (Not Rodgers.)

WANNACUT: lake, Okanogan county, Wash. T. 39 N. R. 26 E. (Not Waunakee, Wennacut, Wonacot, Wannacott, Wanicot, Wanacott, Wannicutt, nor Wannicut.)

WEATHERFORD: creek, Wayne county, Tenn. (Not Rutherford, Rutherford's, nor Rutherfords.)

BELLEVIEW: township, Washington county, Missouri. (Not Belview, Bellview, nor Bellevue.)

CHILICOTAL: spring and mountain, Brewster county, Texas. (Not Chili Corte, Chili Cortal, nor Chili Cotel.)

EAST BRANCH CHENANGO RIVER: stream, branch of Chenango river, in Oneida, Madison, and Chenang counties, New York. (Not East Chenango River nor Chenango Creek.)

KENNYETTO: creek, Fulton county, New York. (Not Kenneto.)

MOUNT VERNON: P. O. and town, Hillsboro county, New Hampshire. (Not Mt. Vernon nor Mount Vernon.)

SAN CRISTOBAL: lake, Hinsdale county, Colorado. (Not San Cristoval, nor San Cristopal.)

STASER: P. O. and R. R. station, Vanderburg county, Indiana. (Not Stacer, Stacers, nor Stasers.)

The Board on Geographic Names was constituted by Executive Order of September 4, 1890, and its decisions are accepted by all the Departments of the Government; now and again to the surprise of mankind. None the less, there are bounds to authority, and it is not easy to believe that the Attorney-General or the Secretary of State will write *Belleview* for *Bellevue*, out of deference to the Board.

(EDITOR BULLETIN.)

OBITUARY.

ADMIRAL SIR ERASMUS OMMANNEY.—This well-known Arctic explorer died in England in December last. He was born in 1814, entered the navy in 1826, and was promoted to the rank of captain in 1846. In 1850–51 he commanded the *Assistance* in the Arctic search expedition under Capt. Horatio Austin, and discovered on Aug. 25, 1850, the first traces of Sir John Franklin, which proved that his ships had wintered at Beechey Island. He also directed an extensive system of sledge journeys, by which the coast of Prince of Wales Land was laid down.

DR. A. M. STÜBEL.—This explorer, ethnologist and geologist, who was especially well known through his studies in vulcanology, died in Dresden on November 10 last. He was sixty-nine years old.

NEW MAPS.

AMERICA.

UNITED STATES.—Geologic Atlas of the United States.

No. 113. Huron Folio. South Dakota. Area, 857 square miles. Between parallels 44° and 44° 30′ N. Lat., and meridians 98° and 98° 30′ W. Long. Scale, 1:125,000, or 1.9 statute mile to an inch. Lies in the valley of the James River, which has a general southward course across the eastern half of the quadrangle. The region is flat and its features are those of subdued glacial topography, the basins being shallow and far apart and the swells very low. All the streams belong to the

James River system. The quadrangle is covered with glacial drift, with the exception of the alluvial flats along the streams. It contains no deposits of valuable minerals or coal, and the most abundant stone is in the form of boulders brought by the glaciers of the Pleistocene period. Underground water is the source of shallow, artesian, and tubular wells.

No. 115. Kittanning Folio. Pennsylvania. Area, 226 square miles. Scale, 1:62,500, or 0.9 statute mile to an inch. Between parallels 40° 45′ and 41° N. Lat., and meridians 79° 30′ and 79° 45′ W. Long. Forms a part of the Appalachian Province. The Allegheny is the principal stream. The surface is hilly, the valleys are narrow, with precipitous sides and narrow or no flood-plains, so that they contain little land suitable for cultivation. Farming is mostly confined to the uplands and manufacturing and mining to the valleys. Bituminous coal is the most important mineral resource, petroleum and natural gas being also very prominent. Limestone and sandstone are extensively quarried.

United States.—Land Classification Map of the Livingston Quadrangle, showing part of the Yellowstone Forest Reserve, Montana. Scale, 1:250,000, or 3.7 statute miles to an inch. Contour interval, 200 feet. U. S. Geological Survey, Washington, 1903.

In Professional Paper No. 29. The areas are distinguished by colours, according to their availability for agriculture or grazing and the quantity of lumber per acre that the forests may yield.

United States.—Land Classification Features of the Big Timber, Granite Mountain and Red Lodge Quadrangles, Montana, including part of the Yellowstone Forest Reserve. Scale, 1:250,000, or 3.7 statute miles to an inch. Contour interval, 200 feet. By John D. Leiberg. U. S. Geological Survey, Washington, 1903.

In Professional Paper No. 29. Four tints of blue show the forest yield of lumber per acre; grassy, alpine, bare rocks, and agricultural areas and snow fields are distinguished.

Canada.—Carte des Sources et du Bassin Supérieur de la Netchakhoh. Scale, 1:600,000, or 9.4 statute miles to an inch. By A. G. Morice. *Bulletin* of the Neuchâtel Geographical Society, Vol. XV, 1904.

The compiler is a missionary, who has traced many of the streams and lakes of this inadequately-mapped part of British Columbia, and whose itineraries, as recorded on this excellent map, contribute important data for the region.

Argentina.—Mapa General de la República Argentina y de los Paises Limítrofes. Scale, 1:2,500,000, or 39.4 statute miles to an inch. By Col. Don Jorge J. Rohde. Published under the auspices of the Instituto Geográfico Argentino, Buenos Aires, 1896.

A four-sheet map of Argentina, the larger part of Chile, the south of Bolivia, the southeastern States of Brazil, Paraguay, and Uruguay. Indicates all the steamship lines entering the La Plata River, the railroads built or in construction, explorers' routes, Indian tribes, and differentiates the towns according to their importance. The nomenclature is very much larger than in the atlases before the public, and numerous little lakes not seen on ordinary maps are shown. Elevations above sea are in meters, all the mining regions are denoted, and large-scale insets show the City of Buenos Aires and its environs and the island of Martin Garcia. This map will be useful to map-makers, excepting that the new boundary between Argentina and Chile must be used.

Chile.—Golfo Corcovado, Estero Palvitao, Rio Yelcho y Ensenada Chaiten.

Chart No. 106. Scale, 1:50,000, or 0.7 statute miles to an inch. By the Hydrographic Office, Santiago, Chile, 1904.

The Gulf of Corcovado separates the mainland from the southern part of the large island of Chiloe. The large scale permits the delineation of all important topographic features. Soundings and heights in meters.

CHILE.—Parte Occidental del Canal Beagle. Scale, 1:250,000, or 3.7 statute miles to an inch. Chart 98, Hydrographic Office, Santiago, Chile, 1904.

This black chart shows the Beagle Channel between the Brecknock Peninsula and Tres Brazos, with many soundings, the ship channel and seven profiles of the coast mountains.

DUTCH GUIANA.—Kaart van het tot Suriname behoorende Stroomgebied van Lawa, Litanie en Goninie. Scale, 1:500,000, or 7.8 statute miles to an inch. *Tijdschrift* of the Royal Netherlands Geographical Society, Vol. XXII, No. 1, Amsterdam, 1905.

This map accompanies a report by Lieut. A. F. Herderschee on the Goninie Expedition in Dutch Guiana. The Survey covers the upper part of the Surinam basin; and as the entire region was practically unknown, this excellent survey provides a large number of new facts for maps of the south-central part of Dutch Guiana. The Lawa, Litanie, and Goninie were traced to their sources among the Oranje and Tumuc-Humac Mountains. These streams, being interrupted by numerous cataracts, are not available for navigation. Many elevations were determined. Heights are given in meters, and the settlements of Indians and Bush negroes are indicated.

SOUTH AMERICA.—Anteil der Deutschen an der Erforschung Südamerikas. Scale, 1:30,000,000, or 473.4 statute miles to an inch. By Paul Langhans. *Deutsche Erde*, No. 6, 1904, Justus Perthes, Gotha.

Shows the areas explored by German travellers in the 16th, 17th, 18th and 19th centuries, and traces von Humboldt's route of 1800.

AFRICA.

AFRICA.—Afrique. Chemins de Fer, Navigation à Vapeur. Scale, 1:17,500,000, or 276.2 statute miles to an inch. *Annales de Géographie*, No. 72, 1904. Librairie Armand Colin, Paris.

Illustrates an article in the *Annales de Géographie* on African railroads. It is the best map showing African steam transportation now before the public. It does not confuse the information given by inserting a large number of railroad projects, but shows only railroads that are in operation or in course of construction. The railroads are in red, and the navigable parts of rivers and lakes serviceable for steam transportation in blue. Ocean cables are also shown. All this information is imposed upon an admirable atlas map of Africa, which is rich in place-names, and brings political information down to date.

PORTUGUESE EAST AFRICA.—Carte du Bas-Limpopo. Scale, 1:1,500,000, or 23.67 statute miles to an inch. By Henri Berthoud. *Bulletin* of the Neuchâtel Geographical Society, Vol. XV, 1904.

Shows the numerous itineraries of Mr. Berthoud in Portuguese East Africa between 1881 and 1898. These journeys contributed some important facts to our knowledge of this part of Africa. He uses the figures of Portuguese explorers for altitude, though admitting that they are probably exaggerated.

MADAGASCAR.—Chemin de fer entre Brickaville et Fanovana. No scale. *Revue de Madagascar*. Vol. 6, No. 12. Paris, 1904.

Shows the route of the railroad recently opened between Brickaville, near the east coast, and Fanovana, 65 miles, together with the extension of the railroad now building and the wagon road from the Indian Ocean to Tananarivo.

ASIA.

ARABIA.—Land Surface Features of Arabia. Scale, 1:10,000,000, or 157.8 statute miles to an inch. By J. G. Bartholomew, Edinburgh Geographical Institute, 1904.

ARABIA.—Orographical Features of Arabia. Same scale and publisher as above.

These fine maps of Arabia give practically all that is yet known of its topographic and cultural features. Six tints show cultivated and cultivable land, steppes, deserts, mountain vegetation, and fresh and salt lakes ; the heights above sea-level are indicated by red and six tints of brown ; sea depths by three shades of blue.

CHINA.—Plan of Kiukiang. Scale, 1 centimeter=75 yards. *Trade Reports* for 1903, Shanghai, 1904.

CHINA.—Yangtse River. Scale, 1:126,730, or 2 statute miles to an inch. *Trade Reports* for 1903, Shanghai, 1904.

The surveys of the south channel at the mouth of the river, made in 1896 and 1903, are printed together, showing the difference in soundings taken at the two periods.

CHINA.—Woosung River Entrance. Scale, 4 cables=1½ inches. *Trade Reports* for 1903, Shanghai, 1904.

The soundings in feet made at the outer bar of the Woosung River, on which Shanghai stands, in 1901 and 1904 are printed together for purposes of comparison.

CHINA.—Map of Eastern Manchuria (in 2 sheets). Scale, 1:840,000, or 13.2 statute miles to an inch. By E. E. Anert. *Memoirs* of the Imperial Russian Geog. Soc., Vol. XXXV, St. Petersburg, 1904 (in Russian).

Shows the routes of four Russian travellers, together with the distribution of mineral deposits, towns, telegraph and post stations, rail and other roads, forts arsenals, important commercial centres, etc.

CHINA.—Geological Map of Eastern Manchuria (in 2 sheets). Scale, 1:840-000, or 13.2 statute miles to an inch. By E. E. Anert. *Memoirs* of the Imperial Russian Geog. Soc., Vol. XXXV, St. Petersburg, 1904 (in Russian).

SIBERIA.—Map of the northern part of the Government of Tobolsk (in 2 sheets). Scale, 1:680,000, or 10.7 statute miles to an inch. *Izviestia* of the Imperial Russian Geog. Soc., Vol. XL, St. Petersburg, 1903 (in Russian).

Illustrates a geographical description of northern Tobolsk by Mr. A. A. Dunin-Gorkavitch.

TIBET.—Plan von Lhasa. Scale, 1:240,000, or .37 statute mile to an inch. *Deutsche Rundschau für Geog. und Stat.*, Vol. XXVII, No. 4, A. Hartleben, Vienna, 1905.

An excellent map in colours, based upon the latest information concerning the plan of Lhasa.

EUROPE.

AUSTRIA-HUNGARY.—Regenverteilung an der Bucht von Cattaro. Scale, 1:200,000, or 3.1 statute miles to an inch. By Prof. Dr. K. Kassner. Justus Perthes, Gotha. *Petermanns Mitteilungen*, Vol. 50, No. 12, 1904.

Illustrates an article by Dr. Kassner on this region, which has the heaviest rain-

fall in Europe. Isohyetal lines connect places having the same amount of annual rainfall, the heaviest precipitation being on the mountains back of the coast.

FRANCE.—Carte Économique du Département d'Indre-et-Loire. Scale, 1:275,000, or 4.3 statute miles to an inch. *Revue* of the Tours Geographical Society, Vol. 21, No. 2, Tours, 1904.

This large-scale map contains a remarkable amount of economic information, including the location of all important manufacturing and mining industries, the distribution of agriculture and the predominant crops, railroads, and the extent of navigation.

SCOTLAND.—Botanical Survey of Scotland. (Fife Sheet.) By the late Robert Smith and Wm. G. Smith. Scale, 1:126,720, or 2 statute miles to an inch. *Scot. Geog. Mag.*, Jan., 1905, Edinburgh.

A beautiful map, prepared by the Edinburgh Geographical Institute, showing by fourteen symbols the predominating types of vegetation and cultivation in eastern Scotland, chiefly between the Firths of Tay and Forth.

POLAR.

ANTARCTIC.—Map showing the track of the *Scotia*, 1903–1904. Scale of latitude, 1:14,000,000, or 220 statute miles to an inch. *Scot. Geo. Mag.*, January, 1905.

Shows the tracks of the Scottish National Antarctic Expedition in its voyages in Weddell Sea during 1903 and 1904. Many soundings in fathoms are given, the coast-line of Coats Land, the part of Antarctica discovered by this expedition, is shown for over 150 miles, and the tracks of earlier explorers are represented in hair lines. This chart completes the most important information required to give on atlas sheets an accurate delineation of the additions to our knowledge of the Antarctic regions made by the recent expeditions.

ATLASES.

STIELER'S HAND-ATLAS.—Neue neunte Lieferungs-Ausgabe. 100 Karten in Kupferstich. Lieferungen 39–40. Justus Perthes, Gotha, 1904. Price, 60 pf. for each part containing 2 map sheets.

No. 8 is a new map of Europe giving more detailed information of the surrounding ocean depths than the sheet it replaces. Other new features are the cable connections with other lands, the main lines of the continental railroad system, and the differentiation of towns according to population. No. 66 replaces the old sheet "Ost-indische Inseln" with a new one, "Hinter-Indien und Archipel" on the same scale —1:12,500,000, or 197.2 statute miles—but with much more information clearly and handsomely presented. Insets show Tonkin, Upper Laos and Cambodia, and Cochin-China on a scale of 1:7,500,000, or 118.35 statute miles to an inch; and Canton and Hongkong on a scale of 1:3,750,000, or 59.18 statute miles to an inch. The seven Africa sheets in the new edition will be from entirely new plates. No. 74 shows South Africa as far north as Bulawayo on a scale of 1:5,000,000, or 78.9 statute miles to an inch; and No. 73 gives Somali Land and Madagascar on a scale of 1:7,500,000.

ACCESSIONS TO THE LIBRARY.

NOVEMBER–DECEMBER, 1904.

AFRICA.

AFLALO, M.—The Truth about Morocco. London, John Lane, 1904. 8vo.

AFRICA, SOUTH, Guide to.—Edited by A. S. Brown and G. Gordon Brown, for the Union-Castle Mail Steamship Co. 1904–1905 Edition. Maps, Plans, etc. London, Sampson, Low, Marston & Co. (1904). 16mo.

CROOKS, J. J.—History of the Colony of Sierra Leone, Western Africa. With Maps and Appendices. Dublin, Brown and Nolan, 1903. 16mo.

DROUET, FRANCIS.—Au Nord de l'Afrique. Notes de Voyage. [Illustrations.] Nice, Place Sasserno, 1896. 4to.

EGYPT EXPLORATION FUND.—The Oxyrhynchus Papyri, *Part IV.* Edited, with Translations and Notes, by Bernard P. Grenfell and Arthur S. Hunt. Eight Plates. London, Egypt Exploration Fund, 1904. 4to.

FERRAND, GABRIEL.—Les Çomâlis, Parts, Ernest Leroux, 1903. 12mo.

GARSTIN, SIR WILLIAM.—Report upon the Basin of the Upper Nile, etc. With Maps and Appendices. Cairo, National Printing Dep't, 1904. Folio. [*Gift, from the Survey Dep't, Public Works Ministry, Cairo, Egypt.*]

GEERE, H. VALENTINE.—By Nile and Euphrates. Maps and Illustrations. Edinburgh, T. and T. Clark, 1904. 8vo. (Imported by Charles Scribner's Sons, New York.)

GIOLI, GINO BARTOLOMMEI.—La Colonizzazione Agricola dell' Eritrea. Memoria letta alla R. Accademia dei Georgofili nell' Adunanze ordinarie del di 4 Gennaio e 1. Febbraio 1903. Firenze, Bernardo Seeber, 1903. 8vo.

MATTHEWS, T. T.—Thirty Years in Madagascar. 62 illustrations. London, Religious Tract Society, 1904. 8vo.

MOCKLER-FERRYMAN, A. F.—British Nigeria. With map, illustrations and Appendix. London, Cassell & Co., 1902. 8vo.

MULAZZANI, A.—Geografia della Colonia Eritrea. Con 52 incisioni e una carta geografica. Firenze, R. Bemporad & Figlio [1904]. 16mo.

NEGREIROS, ALMADA.—Le Mozambique. Avec Cartes et Gravures. Paris, Augustin Challamel, 1904. 8vo.

VELTEN, C., UND LIPPERT, J.—Afrikanische Studien: 1902, 1903. *Mittheilungen des Seminars für Orientalische Sprachen zu Berlin. Jahrgang V–VI, Dritte Abtheilung.* Berlin, G. Reimer, 1902–1903. 2 vols., 8vo.

WRIGHT, E. H. SMITH.—Railways in Rhodesia. With a Description of the Victoria Falls by E. F. Knight. [Illustrations and maps.] (London, British South Africa Co., 1904.). pr., 4to.

AMERICA.

BOMAN, E.—Groupes de Tumulus Préhispaniques dans la Vallée de Lerna (République Argentine). *Extrait de L'Homme Préhistorique, 1904, No. 10.* Paris, Schleicher Frères et Cie, 1904. pr., 8vo. [*Gift, from the Author.*]

Brazil and Bolivia Boundary Settlement.—Treaty . . . signed at Petropolis, Nov. 17, 1903. With Report of Baron Rio Branco. (Maps.) New York, Knickerbocker Press, 1904. pr., 8vo.

Burnaby, Andrew.—Travels through the Middle Settlements in North America. [With map.] Reprinted from the Third Edition of 1798. With Introduction and Notes by Rufus Rockwell Wilson. New York, A. Wessels Co., 1904.

Connecticut Valley Historical Society.—Papers and Proceedings. 1876–1881. Springfield, Mass., Pub. by the Society, 1881. 8vo.

Edwards, William Seymour.—In To The Yukon. With Illustrations. Cincinnati, The Robert Clarke Co., 1904. 8vo.

Helps, Sir Arthur.—The Spanish Conquest in America. *Vol. IV.* New Edition. Edited, with Introduction, Maps and Notes, by M. Oppenheim. London, John Lane, 1904. 8vo.

Hill, Robert T.—Geology and Physical Geography of Jamaica: A Study of Antillean Development. With Appendix on Corals by T. Wayland Vaughan. 41 Plates. Cambridge, 1899. 8vo. *Bulletin, Museum of Comparative Zoölogy at Harvard College, Vol. XXXIV.*

Hough, Franklin B.—American Constitutions: Comprising the Constitution of each State in the Union, and of the United States, &c. [With Map, &c.] Albany, Weed, Parsons & Co., 1872. 2 vols., 8vo.

Hulbert, Archer Butler.—Historic Highways of America, Vol. 14: Great American Canals, Vol. 2, The Erie Canal. Cleveland, The A. H. Clark Co., 1904. 8vo.

Klein, Félix.—Au Pays de "La Vie Intense." Paris, Plon-Nourrit et Cie., 1904. 16mo.

Laut, A. C.—Pathfinders of the West. Being the Thrilling Story of the Men who Discovered the Great Northwest: Radisson, La Vérendrye, Lewis and Clark. Illustrations. New York, The Macmillan Co., 1904. 8vo.

Martin de Moussy [J. A.] V.—Mémoire Historique sur la Décadence et la Ruine des Missions des Jésuites dans le Bassin de La Plata. [Cartes.] Paris, Ch. Douniol, 1864. 8vo.

[Mexico.]—Le Mexique au Début du XXe Siècle. Par MM. Roland Bonaparte, Léon Bourgeois, Jules Clarétie [and Thirteen Others]. (Cartes, &c.) Paris, Ch. Delagrave [1903?]. 2 Tomes. 4to. [*Gift, from the Mexican Government.*]

New Hampshire Historical Society, Collections of the. *Vols. 7 and 8.* Concord, Pub. by the Society, 1863, 1866. 8vo.

Ober, Frederick A.—Our West Indian Neighbors, &c. (Illustrations.) New York, James Pott & Co., 1904. 8vo.

Perl, Albert.—Durch die Urwälder Südamerikas. Mit Sechzig Abbildungen und einer Karte. Berlin, Dietrich Reimer (Ernst Vohsen), 1904. 8vo.

Pote, William, Jr.—The Journal of. During his Captivity in the French and Indian Wars, 1745–1747. (With an Account of the Pote Journal, by John Fletcher Hurst; Historical Introduction, by Victor H. Paltsits.) [Maps, &c.] New York, Dodd, Mead & Co., 1896. 8vo. [*With reproduction of Charles Morris's Map of the Northern English Colonies, &c., 1749, in separate cover.*]

Quevedo, Samuel A. Lafone, *Translator and Editor.* Viaje (de Ulrich Schmídel) al Río de La Plata (1534–1554). Notas Bibliográficas y Biográficas por

Bartolomé Mitre. [Reproduced illustrations and maps.] Buenos Aires, Cabaut y Cía, 1903. 8vo.

San Francisco, Panorama of. From California St. Hill. By Edw. J. Muybridge. San Francisco, 1877. [Photograph, mounted on cloth and folded in folio cover.]

Spears, John R.—The American Slave-Trade. Illustrated. New York, Chas. Scribner's Sons, 1900. 8vo.

Williams, Walter, *Editor*.—The State of Missouri. (With Maps, &c.) (Columbia, Mo.) Missouri Commission, 1904. 8vo.

ARCTIC.

Leclercq, Jules.—Une Croisière au Spitsberg sur un Yacht Polaire. Gravures et carte. Paris, Plon-Nourrit et Cie., 1904. 16mo.

Sverdrup, Otto.—New Land: Four Years in the Arctic Regions. Translated from the Norwegian by Ethel Harriet Hearn. Illustrations and Maps. London, Longmans, Green & Co. 1904. 2 vols., 8vo.

Warren, William F.—Paradise Found: The Cradle of the Human Race at the North Pole. Illustrations. 11th Edition. Boston, Houghton, Mifflin & Co., 1898. 8vo.

ASIA.

Clifford, Hugh.—Further India: The Story of Exploration . . . in Burma, Malaya, Siam and Indo-China. Illustrations and maps. New York, Frederick A. Stokes Co., 1904. 8vo.

Davidson, Augusta M. Campbell.—Present-Day Japan. (Illustrations.) Philadelphia, J. B. Lippincott Co., 1904. 8vo.

Enselme, H.—À Travers la Mandchourie: Le chemin de fer de l'Est Chinois, &c. 26 gravures, 3 plans et 1 carte. Paris, J. Rueff, 1904. 12mo.

Franke, O.—Geistige Strömungen im heutigen China. Vortrag, gehalten in der Abteilung Berlin-Charlottenburg der Deutschen Kolonial-Gesellschaft. Berlin, Dietrich Reimer, 1904. pr., 8vo.

Geil, William Edgar.—A Yankee on the Yangtze. With 100 illustrations. New York, A. C. Armstrong & Son, 1904. 8vo.

Gottwaldt, H.—Die überseeische Auswanderung der Chinesen und ihre Einwirkung auf die gelbe und weisse Rasse. Bremen, Max Nössler, 1903. 8vo.

Hearn, Lafcadio.—Japan: An Attempt at Interpretation. [Illustrated.] New York, The Macmillan Co., 1904. 8vo.

Hearn, Lafcadio.—Kwaidan: Stories and Studies of Strange Things. [Illustrated.] Boston, Houghton, Mifflin & Co., 1904. 16mo.

Hedin, Sven.—Scientific Results of a Journey in Central Asia, 1899–1902. *Vol. I:* The Tarim River. (Maps and Plates.) *Vol. VI, Part I:* Zoologie von Wilhelm Leche. [With Plates.] *Maps, I.* Pl. 1–16, and I–XIV. Stockholm, General Staff of the Swedish Army. 1904. 4to, and Maps, folio.

Hourst, Lieut.—Dans les Rapides du Fleuve Bleu. Voyage de la Première Canonnière Française sur le Haut Yang-Tse-Kiang. Gravures (et carte). Paris, Plon-Nourrit et Cie, 1904. 8vo.

Japan in the Beginning of the 20th Century. Published by the Imperial Japanese Commission to the Louisiana Purchase Exposition. (Printed at Tokyo, Japan Times Office.) 1904. 8vo. [*Gift, from the Japanese Legation, Washington.*]

LEVAT, E. D.—Richesses Minérales des Possessions Russes en Asie Centrale. (6 Planches.) *Extrait des Annales des Mines, livraisons de Février et Mars, 1903.* Paris, Vve. Ch. Dunod, 1903. 8vo.

NIPPOLD, OTFRIED.—Die Entwicklung Japans in den letzten fünfzig Jahren. Bern, K. J. Wyss, 1904. pr., 8vo.

OLUFSEN, O.—Through the Unknown Pamirs. The Second Danish Pamir Expedition, 1898–99. Maps and Illustrations. London, William Heinemann, 1904. 8vo. [*Gift, from the Author.*]

PAVIE, AUGUSTE.—Mission Pavie, Indo-Chine: Études Diverses, Tome III.; Géographie et Voyages, Tomes IV et V. Paris, Ernest Leroux, 1902, 1904. 4to.

PHILIPPINE ISLANDS, 1493–1898.—Explorations by Early Navigators, &c., as related in contemporaneous Books and MSS. Translated from the Originals. Edited, etc., by Emma Helen Blair and James Alexander Robertson. With maps, etc. Vols. XIX, XX, XXI. Cleveland, A. H. Clark Co., 1904–1905. 8vo.

PITON, CHARLES —La Chine: sa religion, ses mœurs, ses missions. 32 gravures. Lausanne, Georges Bridel & Cie. (1902.) 16mo.

REES, J. D.—Russia, India and the Persian Gulf, or the Western Frontiers of India. (*Published as an article in the* Asiatic Quarterly Review *for April, 1903.*) With speeches by the Right Hon. Sir Charles W. Dilke, Sir George Birdwood, and Mr. H. F. B. Lynch. London, Harrison & Sons, 1903. pr., 8vo.

SCOTT, J. E.—In Famine Land: Observations and Experiences in India, . . . 1899–1900. Illustrated. New York and London, Harper & Brothers, 1904. 8vo.

SYKES, MARK.—Dar-Ul-Islam. A Record of a Journey through ten of the Asiatic Provinces of Turkey. Appendix by John Hugh Smith. Introduction by E. G. Browne. Maps and Illustrations. London, Bickers & Son; New York, Charles Scribner's Sons, 1904. 8vo.

WEALE, B. L. PUTNAM.—Manchu and Muscovite. Being Letters from Manchuria, 1903. (Illustrated.) London, Macmillan & Co., 1904. 8vo.

AUSTRALASIA.

ROWLAND, PERCY F.—The New Nation: A Sketch of the . . . Australian Commonwealth. London, Smith, Elder & Co., 1903. 8vo.

SMYTHE, MRS. (S. M.)—Ten Months in the Fiji Islands. Maps, &c. Oxford and London, J. Henry and J. Parker, 1864. 8vo.

SPENCER, B., AND GILLEN, F. J.—Northern Tribes of Central Australia. (With maps, &c.) London, Macmillan & Co., 1904. 8vo.

EUROPE.

COOK, JOEL.—Switzerland: Picturesque and Descriptive. Illustrated. Philadelphia, Henry T. Coates & Co., 1904. 8vo.

CRUDEN, ROBERT PIERCE.—History of the Town of Gravesend, in the County of Kent, and of the Port of London. (Illustrated.) London, W. Pickering, 1843. 8vo.

ERÖDI, BÉLA.—Geographical Science in Hungary. Paper presented to the Eighth International Geographical Congress in America, Sept., 1904. [Hungarian and English Text.] Budapest, 1904. pr., 8vo. [*Gift, from the Author.*]

GARDNER, EDMUND G.—The Story of Siena and San Gimignano. Illustrated. London, J. M. Dent & Co., 1904. 16mo. *Mediæval Towns Series.*

GRIECHENLAND.—Handbuch für Reisende von K. Bædeker. Mit Panorama von Athen, 11 Karten, 19 Plänen, 5 Grundrissen u. 2 Tafeln. 4te Auflage. Leipzig, K. Bædeker, 1904. 16mo.

HEADLAM, CECIL.—The Story of Nuremberg. Illustrated. London, J. M. Dent & Co., 1901. 16mo. *Mediæval Towns Series.*

ITALY from the Alps to Naples. Handbook for Travellers. By K. Bædeker. 26 maps and 44 plans. Leipsic, K. Bædeker, 1904. 16mo.

NOYES, ELLA.—The Story of Ferrara. Illustrated by Dora Noyes. London, J. M. Dent & Co., 1904. 16mo. *Mediæval Towns Series.*

PARIS AND ENVIRONS, with Routes from London to Paris. With 13 maps and 38 plans. Leipzig, K. Bædeker, 1904. 16mo.

PENCK, ALBRECHT.—Der Bodensee. (Mit einer Karte.) Vorträge des Vereines zur Verbreitung naturwissenschaftlicher Kenntnisse in Wien. XXII Jahrgang. Heft 6. Wien, 1902. 16mo.

PETERS, CARL.—England und die Engländer. 2te Auflage. Berlin, C. A. Schwetschte und Sohn, 1905. 8vo.

PEUCKER, K.—Kleines Orts-Lexikon von Österreich-Ungarn, &c., &c. Wien, Artaria & Co., 1904. 16mo.

PHILIPPSON, ALFRED.—Das Mittelmeergebiet. Seine Geographische und Kulturelle Eigenart. 10 Karten, Tafeln, &c. Leipzig, B. G. Teubner, 1904. 8vo.

WHEATLEY, H. B.—The Story of London. Illustrated. London, J. M. Dent & Co., 1904. 16mo. *Mediæval Towns Series.*

GEOGRAPHY.

BRIGHAM, ALBERT PERRY.—Students' Laboratory Manual of Physical Geography. (Illustrated.) New York, D. Appleton & Co., 1905. 12mo. *Twentieth Century Text-Books.*

DODGE, RICHARD ELWOOD.—Elementary Geography; Advanced Geography. (Maps and Illustrations.) Chicago, Rand, McNally & Co., 1904. 2 vols., 4to.

GÜNTHER, SIEGMUND.—Geschichte der Erdkunde. (*Die Erdkunde herausg. von Maximilian Klar, I. Teil.*) Leipzig u. Wien, Franz Deuticke, 1904. pr., 8vo.

HUXLEY, T. H.—Physiography: An Introduction to the Study of Nature. Revised and Partly Rewritten by R. A. Gregory. Illustrations. London, Macmillan and Co., 1904. 8vo.

KNOX, ALEXANDER.—Glossary of Geographical and Topographical Terms, &c. *Stanford's Compendium of Geography and Travel* (*Supplementary Volume*). London, Edward Stanford, 1904. 8vo.

MCMURRY, CHARLES A.—Excursions and Lessons in Home Geography. [Illustrated.] New York, The Macmillan Co., 1904. 16mo.

RUSSELL, ISRAEL C.—Co-operation among American Geographical Societies. An Address before the Section of Geology and Geography, American Association for the Advancement of Science, Philadelphia Meeting, Dec. 27–31, 1904. *Advance pages from the Proceedings Am. Ass., Vol. LIV, 1905.* Washington, D. C., Gibson Bros., 1904. pr., 8vo. [*Gift, from the Author.*]

WAGNER, HERMANN.—Lehrbuch der Geographie. *1er Band:* Einleitung. Allgemeine Erdkunde. Mit 85 Figuren. Hannover u. Leipzig, Hahn'sche Buchhandlung, 1903. 8vo.

WITTRISCH, MAX.—Methodisches Handbuch für den Unterricht in der mathematischen Geographie in der Volksschule. [With cuts.] Halle a. d. Saale, Hermann Schroedel, 1904. 8vo.

MAPS AND ATLASES.

[ARCTIC.] SECOND NORWEGIAN POLAR EXPEDITION in the "Fram," 1898–1902. Seven maps by Capt. G. I. Isachsen. Lithographed in colour. *From "New Land" by Otto Sverdrup.* (1.) Map showing the area mapped by the expedition. *Scale:* 1: 2,000,000=31.56 miles=1 inch. *Size:* 18⅛ x 22¾ inches; (2.) Buchanan Bay and Bache Peninsula. *Scale:* 1: 410,000=6.4 miles=1 inch. *Size:* 13¼ x 7 inches; (3.) *The same*, Norwegian text. *Scale:* 1: 200,000=3.1 miles=1 inch; (4.) Western Part of Jones Sound. *Scale:* 1: 410,000=6.4 miles=1 inch. *Size:* 7⅛ x 12½ inches; (5.) *The same*, Norwegian text. *Scale:* 1: 200,000=3.1 miles=1 inch; (6.) Havnefjord with Sydkapfjord. *Scale:* 1: 348,480=5.5 miles=1 inch. *Size:* 4 x 12 inches; (7.) Jones Sund. *Scale:* 1: 1,140,600=18 miles=1 inch. *Size:* 15 x 6½ inches. [*Gift, from Capt. G. I. Isachsen, Christiania.*]

ATLANTE DELL' AMERICA contenente le migliori carte geografiche e topografiche delle principali Città, Laghi, Fiumi e Fortezze del Nuovo Mondo. Livorno, G. T. Masi, 1777. Folio.

CEYLON.—From Surveys . . . 1896–1903. F. H. Grinlinton, Surveyor-General. *Scale:* 1:506,880=8 miles=1 inch. Colombo, Survey Department [1904]. Colored, mounted as a wall-map. [*Gift, from the Survey Department, Colombo, Ceylon.*]

CHILE.—Five Charts of the Coast, published by the Oficina Hidrográfica, 1903–1904. Various scales and sizes:

No. 102: Golfo Corcovado [3 Charts on one sheet], Bahia Tic-Toc; Puerto Auchemó; Puerto Yelcho.

No. 103: Estuario i Canal Baker.

No. 104: Canal Messier, Puertos en el Estuario Baker [13 Charts on one sheet], Puerto Merino Jarpa; Caleta Laguera; Puerta Valdés; Caleta Dewet; Puerto Valenzuela; Puerto Cueri-Cueri; Puerto Tres Meses; Puerto Contreras; Puerto Alvarez; Puerto Brown; Rio Huemules; Puerto Queltehue; Puerto Francisco.

No. 105: [2 Charts on one sheet], Puerto Zapallar; Bahia de Papudo.

No. 114: Bahia de Quintero.

[*Gift, from the Oficina Hidrográfica, Valparaiso, Chile.*]

[CHINESE MAPS, ANCIENT. 13 sheets, each 14 x 12 inches, folded in 12mo book form, pigskin covers.]

LA PAZ. [Bolivia.] Ensanche de la Ciudad, 1903. Escala, 1:1,000=83 feet=1 inch. *Size:* 23½ x 17 inches. [*Gift, from the Oficina Nacional de Inmigración Estadística y Propaganda Geográfica, La Paz.*]

LA PAZ. [Bolivia.] Plano de la Ciudad. Levantado por la Comision Topográfica, 1902. *Scale:* 1:4,000=333 feet=1 inch. *Size:* 27 x 17½ inches. Colored. [*Gift, from the Oficina Nacional de Inmigración, Estadística y Propaganda Geográfica, La Paz.*]

LONDON AND ITS ENVIRONS—ORDNANCE SURVEY MAPS.

1. Scale of 6 inches to 1 mile=1:10,560. Revised, 1891 to 1895. 48 Sheets. *Size:* [of each sheet] 18 x 12 inches. 1902–1904.

2. Scale of 6 inches to 1 mile=1:10,560. Skeleton Map. Survey of 1848–50 (Unrevised). Sheet 7. *Size:* 35¾ x 24 inches. 1865.

3. Scale of 12 inches to 1 mile=1:5,280. Skeleton Map. Survey of 1848–50 (Unrevised). Sheet VII. S. E. *Size:* 35½ x 24 inches. 1851.

4. Scale of 25.344 inches to 1 mile=1:2,500. Survey of 1862–73. Sheet XLIV. *Size:* 33¾ x 24¼ inches. 1879.

5. Scale of 5 FEET to 1 mile=1:1,056. Survey of 1873–75 (Unrevised). Sheet VII. 66. *Size:* 35½ x 24 inches. 1875.

6. Scale of 3 inches to 1 mile=1:21,120. Index to the Revised Survey of London on the Scale of 5 feet to 1 mile. Edition of 1894–95. 5 Sheets, various sizes. 1897.

Southampton, Ordnance Survey Office.

[MAGELLAN STRAIT, PARTS OF.]—Two Charts published by the Oficina Hidrográfica, Chile, 1903. Various scales and sizes:

No. 94: [2 Charts on one sheet], Puerto Condor, Canal Jerónimo; Bahia Sholl, Canal Magdalena (Tierra del Fuego).

No. 95: [2 Charts on one sheet], Canales de Entrada de la Bahia Jente Grande; Bahia Jente Grande. [*Gift, from the Oficina Hidrográfica, Valparaiso.*]

MASSACHUSETTS, Official Topographical Atlas. Compiled by Walling & Gray. Boston, Stedman, Brown & Lyon, 1871. Square folio.

VARIOUS.

ALMANACH DE GOTHA, 1905. Annuaire Généalogique, Diplomatique et Statistique. Gotha, Justus Perthes (1904). 16mo.

AMERICAN BOOK PRICES CURRENT, 1904. Compiled from the Auctioneers' Catalogues by Luther S. Livingston. New York, Dodd, Mead & Co., 1904. 8vo.

ATOLL OF FUNAFUTI: Borings into a Coral Reef and the Results. Being the Report of the Coral Reef Committee of the Royal Society. 1 vol. (Illustrated) and Case of Maps. London, Royal Society, 1904. 4to.

BOEHM, EDGAR COLLINS.—The Persian Gulf and South Sea Isles. (Illustrations.) London, Horace Cox, 1904. 8vo.

DEHN, PAUL.—Weltwirtschaftliche Neubildungen. 2te Auflage. Berlin, Allgemeiner Verein für Deutsche Litteratur, 1904. pr., 8vo.

DEUTSCH-UNGARISCHES und Ungarisch-Deutsches Wörterbuch. Pesth, A. Hartleben, 1827. 2 vols., 8vo.

DICTIONARY of National Biography. Errata. London, Smith, Elder & Co., 1904. 8vo.

DUNSTAN, WYNDHAM.—Report to the Board of Trade on Cotton Cultivation in the British Empire and in Egypt. (With map, etc.) Presented to both Houses of Parliament. London, H. M. Stationery Office, 1904. Folio.

DUTTON, CLARENCE EDWARD.—Earthquakes: in the light of the New Seismology. Illustrated. New York, G. P. Putnam's Sons, 1904. 8vo.

EGERTON, HUGH EDWARD.—Origin and Growth of the English Colonies and of their System of Government. An Introduction to Mr. C. P. Lucas's Historical Geography of the British Colonies. (8 maps.) Oxford, Clarendon Press, 1903, 16mo.

ENCYCLOPEDIA, JEWISH.—Vol. VIII. Leon–Moravia. *Illustrated.* New York and London, Funk & Wagnalls Co., 1904. 8vo.

[ENCYCLOPÆDIA.] MEYERS Grosses Konversations-Lexikon. (6te Auflage.) Band VIII. Leipzig u. Wien, Bibliographisches Institut, 1904. 8vo.

GRAY, ASA.—Scientific Papers of. Selected by Charles Sprague Sargent. Boston, Houghton, Mifflin & Co., 1889. 2 vols., 8vo.

GRIERSON, P. J. HAMILTON.—The Silent Trade. A Contribution to the Early History of Human Intercourse. Edinburgh, William Green & Sons, 1903. 8vo.

HARASZTHY, A.—Grape Culture, Wines and Wine-Making. With numerous illustrations. New York, Harper & Bros., 1862. 8vo.

JAHRBUCH DES OESTERREICHISCHEN ALPEN-VEREINES. Bände 2–26, 1866–1895. [With maps and plates.] Wien, München, et al. 28 vols. in 19. 8vo.

JURIEN DE LA GRAVIÈRE, E.—Guerres Maritimes sous la République et l'Empire. Nouvelle edition, revue, corrigée et tres augmentée. Plans des batailles navales . . . . et Carte. Paris, G. Charpentier, 1883. 2 tomes, 12mo.

MCGREGOR, A. W.—English–Kikuyu Vocabulary. Compiled for the use of the C. M. S. Missions in East Africa. London, Soc. for Promoting Christian Knowledge, 1904. 16mo.

MILNE, JOHN.—Earthquakes and Other Earth Movements. 5th Edition. With figures. London, Kegan Paul, Trench, Trübner & Co., 1903. 8vo.

OPPEL, A.—Die Baumwolle, nach Geschichte, Anbau, u. s. w. Mit 236 Karten u. Abbild. Leipzig, Duncker & Humblot, 1902. 8vo.

RATZEL, FRIEDRICH.—Über Naturschilderung. Mit 7 Bildern in Photogravüre. München und Berlin, R. Oldenbourg, 1904. 8vo.

RIBBE, CARL.—Zwei Jahre unter der Kannibalen der Salomo-Inseln. Unter Mitwirkung von Heinrich Kalbfus. Abbild., Tafeln und 3 Karten. Dresden-Blasewitz, Hermann Beyer, 1903. 8vo.

THIMM, C. A.—Dutch Self-Taught. With Phonetic Pronunciation. London, E. Marlborough & Co., 1904. 16mo.

TOWNSEND, MEREDITH.—Asia and Europe. 2nd Edition. New York, G. P. Putnam's Sons, 1904. 8vo.

VIGNAUD, HENRY.—La Maison d'Albe et les Archives Colombiennes. Avec un Appendice . . . ., et un Tableau Généalogique. *Extrait du Journal de la Société des Américanistes de Paris, tome 1er, no. 3.* (Paris), Siège de la Société, 1904. pr., 8vo. [*Gift, from the Author.*]

WANG, FERDINAND.—Grundriss der Wildbachverbauung. *2ter Theil.* Abbild. und Figuren. Leipzig, S. Hirzel, 1903. pr., 8vo.

WEINTZ, H. J.—Japanese Grammar Self-Taught. (In Roman character.) With Phrases and Idioms. London, E. Marlborough & Co., 1904. 8vo.

BOOK NOTICES.

The Persian Gulf and South Sea Islands. By Edgar Collins Boehm. xiii and 189 pp., 15 illustrations, and Index. Horace Cox, London, 1904.

The interest of this narrative of travel is enhanced by the fact that the author, in his visit to the Persian Gulf, had the chance of seeing many out-of-the-way places that tourists seldom happen upon. His descriptions, therefore, of pearl-fishing at the Bahrein Islands, of the Tigris and Euphrates Rivers, of Muscat and Bagdad, and of other scenes will be entirely new to many readers. He says that visitors to the Persian Gulf should be equipped with useful letters of introduction, as there are no hotels, and when the steamers depart one is entirely dependent upon the hospitality

and advice of the residents. Those who travel inland, off the beaten tracks and without consular assistance, take their lives in their hands, and are at the mercy of thieves and brigands. The chapters on the Pacific Islands are entertaining reading, with nothing especially new about them excepting some rather gruesome pictures of the old days of cannibalism in Fiji.

Further India, being the Story of Exploration from the Earliest Times in Burma, Malaya, Siam, and Indo-China. By Hugh Clifford. 367 pp., 48 illustrations, including black maps; also a map in colours, bibliography, and index. Frederick A. Stokes Company, New York, 1904.

Mr. Clifford has written an able and an erudite book on the exploration of the Indo-China Peninsula. These countries failed for centuries to appeal strongly to the imagination of the European peoples, the author thinks, because they lie midway on the sea route from India to China and have been overshadowed by the immensity and the surpassing fascination of their mighty neighbours. The real exploration of this region beyond the limits of the coast lands was not accomplished until during the latter half of the nineteenth century; and the world at large still knows little of this great work of exploration carried out by Francis Garnier and other remarkable men.

The author traces the knowledge gained by Europeans of these lands from the earliest days until the time in the last century when the spread of European influence made the scientific exploration of the *Hinterland* a possibility. Then the story of Garnier's work and that of his successors is told with graphic and sympathetic power; and the final chapter shows us the great peninsula as it now stands revealed through the completed work of these explorers. The book supplies a lack in the history of exploration, for nothing has hitherto been published in comparatively small compass that gives so complete an idea of the means by which we finally arrived at our present knowledge of the geography of the Indo-China Peninsula.

Durch die Urwälder Südamerikas. Von Capt. Albert Perl. 235 pp., 60 illustrations, and a map. Dietrich Reimer (Ernst Vohsen), Berlin, 1904. (Price, 8 m.)

The writer lived about eight years in the rubber forests of the Amazon basin, travelled up the Amazon to its sources, and also along the Madeira, Purus, Beni, Madre de Dios, Acre, and other rivers from their mouths to their fountainheads, besides taking long trips among the Andes and along the Pacific and Atlantic coasts. Business, and not geography, impelled him; but his book was well worth writing, and may be recommended to all readers of German who would like to know more of the little-known phases of life in the great forest regions of South America. The book abounds with stories of interesting personal experience, with sketches of nature and of phases of natural history, with glimpses of the perils of navigation and of the dangers of the climate; and one gets an idea of the Indians and of the very rough white citizens who have been drawn together into these dark forests by the attraction of rubber. It is doubtful if this book has a counterpart as a faithful description of pioneering in the rubber regions of the Amazon.

Dodge's Advanced Geography.—Part I. Principles of Geography. Part II. Comparative Geography of the Continents. By Richard Elwood Dodge. 4to. Chicago, Rand, McNally & Co. (1904).

In Part I of this book the author has treated the subject in a clear and simple form. The style is animated, and the pages are made attractive by excellent illustrations, though the plates devoted to heat-belts and temperature, and those showing

the winds, are unsatisfactory, because of the faint outline of the continents. This defect seriously interferes with the possibilities of inductive work. Quite in contrast are the excellent plates on page 52 showing atmospheric pressure and winds with accompanying storm areas, in the United States, for two consecutive dates.

The Second Part of the book, on the comparative geography of the continents, begins with North America. Existing conditions are discussed in their geographical significance, according to the author's plan in Part I. But this section seems to lack the dignity and terseness so manifest in the preceding chapters. The human element is not sufficiently emphasized. Notwithstanding this limitation, Part II has value, for the text is so profusely illustrated with well-chosen subjects that intensive work may be accomplished with the pictures, exclusive of the text. Scales illustrating the rank of countries, in commerce and important crops, occur at frequent intervals. The reference tables at the end of the book include some of the great trade routes and a list of important commercial countries, with their leading productions, exports, and imports. Such statistics, in the hands of an able teacher, will furnish the basis for geography lessons that will give the pupils a broader understanding than can be obtained from a mere description.

The book includes a large number of maps, physical, political, and commercial. Of these the first show the highest degree of excellence. The colour scheme is satisfactory and the names are in clear type. These maps are exceptional in certain respects. The clever device used to show the drainage divide and the marking of the climatic zones by their special isotherms afford an opportunity for deductive work that is not attainable in the usual physical map. The legend has a unique plan for explaining the colour scheme of ocean depths and land elevations.

Many of the political maps are clear and the names are printed in plain type. Of these the map of the United States is a good example. The same cannot be said of certain sectional maps. Those of the Mississippi Basin might be of more use if fewer names were printed and a larger type used. The multitude of dots, for towns and villages, and the fine print do not seem to have been dictated by geographical considerations.

Railroad routes are scantily indicated on commercial maps only, and those maps are so crowded with names that successful teaching is impossible.

Such defects in this otherwise excellent book prove the impossibility of arranging a text-book and an atlas in the same volume.

The book has a complete index and the suggestions for collateral reading, at the end, show care in selection. Pages are often specified in the books mentioned, and the references are classified according to the various chapters in this book.

With its wealth of pictures and an individual plan, this book has a high rank as a text-book of geography.

M. E. K.

Adelphi Academy.

The Countries of the King's Award. By Col. Sir Thomas H. Holdich. xv and 420 pp., 93 reproductions from photographs and a map. Hurst & Blackett, London, 1904.

Sir Thomas Holdich's visit to Argentina and Chile as a member of the Tribunal of Arbitration in the boundary dispute was not a long one, but he had exceptional opportunities to see a large extent of both countries, and his trained geographic instinct gives special value to his comments on what he saw. He describes the Andean region through which the boundary passes, most of which was practically unknown until revealed by the survey. This is the first detailed account of the

region, and it is of much geographic interest. The Commission's examination included 800 miles of linear geography in one of the roughest regions in the world. Sir Thomas thinks that the prospects of both countries are bright. He says:

> Both countries possess a climate in which strong men are reared; . . . . and that, equally, the two States may share the advantages of the constant intercourse with Europe which will be gained by the future existence across them of one of the main commercial ways of the world. Trans-Andine railways will, ere long, develop to a Trans-Patagonian route to Australia from Europe and the establishment of important commercial centres at other points than Buenos Aires and Santiago . . . . But Chile and Argentina want immigrants, but immigrants of the right sort . . . . who come to stay, and who will, in the magnificent climate of those southern lands, people the country with a race physically powerful and intellectually keen. And they want decentralization—less crowding in the capitals and a more scattered population in provincial centres and country towns. All this can only result from wider extension of means of communication and the wider spread of those necessities of civilization which make a wilderness habitable.

Sir Thomas gives many interesting facts relative to the people and industries of Argentina and Chile, the physical aspects of both countries, their railroads and traffic, and the colonies in Patagonia and the Andes. A chapter is given to Tierra del Fuego and its natives, another to southern Patagonia, and others to Buenos Aires and Santiago. The work is a fine specimen of book-making and is beautifully illustrated, most of the pictures being typical views of the southern part of South America.

England und die Engländer. Von Dr. Carl Peters. Second unaltered edition. vii and 284 pp., and an index. C. A. Schwetschke & Son, Berlin, 1905. (Price, m. 6.)

Dr. Peters says that his views of England and its people are based upon his own observations and experiences among all classes of society during more than ten years. He adds that, as he has endeavoured to treat many aspects of a great nation, it is impossible that he should not at times have fallen into error, in which opinion the English heartily agree with him, as they are by no means ready to accept Dr. Peters's dictum as to the nature and bent of their national genius and their present position in the world. He has not a few kindly words for the English and their institutions, but, on the whole, they are, he thinks, in a state of intellectual decadence; they are immoral, and are being outstripped by other nations in industry and commerce. At the same time, the author pays due tribute to the qualities that made the English the builders of a mighty empire. Dr. Peters invests his descriptions of London, Parliament, politics and the press, education, social life, and other topics with an interest that never flags, and he seasons the whole with a sprinkling of cynicism and a somewhat caustic humour. To say the least, the book is very readable.

Die Lüneburger Heide. Von Dr. Richard Linde. 149 pp., 111 photographic illustrations, a map in colours, and index. Velhagen & Klasing, Bielefeld und Leipzig, 1904.

The book fully sustains the reputation which the earlier volumes have given to the excellent "Land und Leute" series—and this without having the advantage of fine and inspiring landscapes to heighten the charm of the many illustrations, for the Heath of Lüneburg, to the east of the Plain of Hanover, is one of the least picturesque parts of Germany, although flowers, clumps of trees, ravines and a boundless horizon give the low plain more attractions than some visitors have accorded to it. The numerous photographs show that even this sterile tract has its peculiar charm, and the glimpses they give of the humble life of the peasants, of the flocks of sheep that hold undisputed possession and adorn many of the landscapes, of the forests of birch, oak and beech that grow luxuriantly in the bottom lands, and of the agricul-

tural settlements, many of which are newly formed, are very interesting. A fine map enhances the pleasure and profit of reading the book. This region is only two hours from Hamburg, the Elbe skirts its northeast part, and it is well worth a visit.

Griechenland. Von K. Baedeker. (Fourth Edition.) cxxxiv and 438 pp., a panorama of Athens, 11 maps, 24 plans and 2 tables. Karl Baedeker, Leipzig, 1904. (Price, m. 8.)

The facilities for visiting the oldest home of the beautiful in art have been improved, and the number of tourists to Greece is increasing every year. The first edition of this handbook was issued in 1882, and was based upon the manuscript of the late Dr. G. Lolling, one of the leading authorities on Greece of that day. To secure the latest material for the present edition, Dr. Dietrich Bender, of Leipzig, has travelled over the larger part of the kingdom, and the volume shows the great progress in archæological exploration and the development of means of communication, which enables tourists to extend their travels in the East. Other authorities have written the sections concerning such special points of interest as Olympia and Delphi, and the descriptions of Crete and the smaller islands are entirely new. Large parts of the archæological descriptions also appear in this edition for the first time. The maps have been re-drawn and the plans have been revised and increased in number. The volume shows that no pains have been spared to make it adequate to the needs of tourists.

Die Entwicklung des deutschen Wirtschaftslebens im 19. Jahrhundert. Von Prof. Dr. Ludwig Pohle. (5 Lectures.) vi and 132 pp. No index. B. G. Teubner, Leipzig, 1904. (Price, m. 1.25.)

Dr. Pohle delivered these lectures, on the economic development of Germany in the past century, at Frankfort in the winter of 1903–04. In the first lecture he gives a general view of this development, with special reference to the changes in the activities of the people, brought about by the transformation of the country from an agricultural to an industrial state; the second lecture deals with the changes caused by the influence of agrarian reforms and the pressure of increasing population. The third discusses the position of the old industrial forms of hand-work and household manufactures ; the fourth treats the development of the great industries and their accompanying phenomena; and the fifth, the growth of commerce and communications. The nation made wonderful progress in population, power, and freedom, because its industrial life was wholly transformed by the modern idea of employing large capital in business and by new facilities for communications and new methods in banking and trade. This transformation brought great blessings to the nation, but not without inflicting much suffering, and even ruin, upon many thousands of individuals, the victims of the economic battle. The statistics of the subject could scarcely be introduced in this brief but forceful presentation. The author gives a list of the German books in which the subject, in some or many of its phases, is more fully treated.

Pioneering in Central Africa. By Samuel P. Verner. ix and 500 pp., 14 half-tone pictures, 5 maps, and an index. Presbyterian Committee of Publication, Richmond, 1903. (Price, $1.75.)

This is one of the best books yet written on any part of the Congo basin. Mr. Verner had experience in practical affairs, such as railroad transportation, the care and running of machinery, and carpentry, before he went to the Congo in 1896 as business

manager of a missionary enterprise at Luebo in the south central part of the Congo basin, about 1,000 miles from the mouth of the river. This work was an attempt to utilize the American negro to elevate his sable brothers in the heart of Africa. The enterprise is manned chiefly by coloured persons from Mississippi, Virginia, and Alabama, and the fact that it has accomplished most practical and useful results points to the efficiency of the mission. Mr. Verner extended the work over 50 miles to the southwest of Luebo and devoted three years to its interests. He returned to that region last year and brought back with him the pygmies who were seen at the World's Fair in St. Louis.

Mr. Verner is more sanguine than many writers on Africa, and the facts he gives seem to justify his faith in the future of the continent. He praises in the highest terms the efforts of the Government of the Congo Free State and of the missionaries, both Protestant and Roman Catholic, for their philanthropic and educational work among the natives. Both the Government and the missionaries give assiduous attention to the maintenance of schools which include excellent training in carpentry, cabinet work, brickmaking, printing, tailoring, agriculture, and other industrial branches.

He thinks the natives have large capacity, and regards them as wonderfully adept in many branches of work, such as blacksmithing, cloth and mat weaving, wood working, pottery, tanning, house building, etc.; but the coming generations will be able to do much more than the adults of to-day for the reclamation of Africa:

> The hope for heathen and barbarous races lies in their children; and the marvelous progress made by these African youth in accommodating themselves to the changed conditions, in assimilating Christian ideas, and in adopting the Western civilization was the most hopeful fact I observed during my life in Africa (p. 129).

A large factor in the progress of the natives is the prohibition of the sale of spirituous liquors among them:

> It was a matter of gratification that the international prohibition of the importation and sale of intoxicating liquors in the Central African Zone was so effectively executed. There was, therefore almost no drunkenness at all among the natives. The sap of the oil palm which made the famous palm wine was unusually mild and innocuous, and only when fermented was it sufficiently alcoholic to intoxicate (p. 137).

Mr. Verner was especially impressed with the agricultural and mineral resources of the part of the Kasai basin in which he lived, with the intelligence, ability and progressive ideas of Ndombe, the King who rules over a large district in that region, and with the possibility of white colonization in some parts of the high plateau of the Congo basin. He speaks of the Congo railroad around the 235 miles of cataracts in the lower river as very remarkable in its success:

> So well have the projectors of this railway been rewarded for their faith and daring that the stock of the railway, at a par value of 100, stands now, ten years since the beginning of construction, at over 4,000 on the Bourse of Brussels, and the profits of the original investors have been enormous. The railway has practically a monopoly of all the transportation for the whole immense Congo Valley (p. 59).

The book should be read by all who are interested in the present condition of tropical Africa and the development in progress.

The Congo. By Roland de Marès. vi and 113 pp. J. Lebègue & Co., Brussels, 1904. (Price, 1 fr.) (In English.)

Articles printed in the *Indépendance Belge* during June and July, 1904, in reply to attacks upon the Congo Free State.

Les Mines de l'Afrique du Sud. Par Albert Bordeaux. viii and 211 pp. 8 plates of maps and plans and index. Vve. Ch. Dunod, Paris, 1898.

This is not a new book, but the geological facts and much other information require no change to adapt them to existing conditions. The work treats of most of the gold and diamond mines of South Africa, including the less-known districts, as well as the great mines of the Rand and Kimberley. It is the result of three years of study in these mining regions by an accomplished mining engineer of France.

The Policy and Administration of the Dutch in Java. By Clive Day. xxi and 434 pp. and index. The Macmillan Company, New York, 1904. (Price, $2.)

A scientific history in English of the experience and work of the Dutch in Java would long ago have been welcomed as a most valuable chapter in the annals of colonial enterprise. Unfortunately, a satisfactory work of this kind has never been accessible to English-speaking students of colonial affairs. This book, by the assistant Professor of Economic History in Yale University, fills the need, and may be regarded as one of the most important contributions to colonial topics that has been made in a long time.

Mr. Day found his material in the writings of the Dutch historians, and in original documents covering the whole period of the Dutch occupancy from early in the 17th century, when the Dutch East India Company began its operations in Java, until modern conditions in government supplanted the older policies. The last three chapters describe the most recent methods of the Dutch régime and connect the past of Java with its present.

The history of Java before the arrival of the Dutch is treated with especial reference to the native political and economic organization, the absolutism of the rulers, and its bad effects, the weakness and corruption of the Governments and the unfavourable condition of the mass of the people. Then came the Dutch East India Company with gain as its only goal, a commercial policy based upon monopoly, and a Government marred by inefficient fiscal administration and corruption among the officials. The reasons for the decline of the Company's commerce and for its final ruin are discussed; and the coming into power of Governor-General Daendels is described, with his arbitrary rule, his fiscal difficulties, his abuse of the forced-labour system, and his genuine reforms. Then follows the period of British occupation and rule, with its failures and partial successes, and the Dutch restoration, ushering in the famous régime of Van den Bosch, with his forced labour and the high profit which it yielded to the home Government.

The author believes that the abuses of this period followed in the main as a result of the principle of forced labour under Government management for Government profit:

> The Dutch made money for a time, but they sacrificed their permanent interests in the process. They prevented the education of native laborers; they prevented organization by European planters, and the revenue that they got was no compensation for the check on Java's productive power (pp 341–342).

The closing chapters discuss the recent economic policy, with the exploitation of Java's resources largely in the hands of capitalists, the modern government and provincial administration and the fiscal policy. The Government has taken to itself the property right in land, but has left the natives in hereditary possession. There can be no transfer of rights from natives to non-natives, no valid sale to a foreign Oriental or to a European. The foreign planter, who now figures so largely, can lease land for a short term, but cannot purchase it. The impossibility under the laws of alienating landed property is a great blessing to the Javanese.

／BULLETIN

OF THE

AMERICAN GEOGRAPHICAL SOCIETY.

Vol. XXXVII **1905.** **No. 3**

ADDRESS OF PRESIDENT PEARY.

DELIVERED AT THE ANNUAL MEETING OF THE AMERICAN GEOGRAPHICAL SOCIETY, JANUARY 24, 1905.

Our meeting to-night is the first in our second half century, and we enter upon this second half century with a fine home, a valuable library, and a position of financial stability.

We have now the fundamental essentials of equipment.

Our next need is a larger membership, to permit a more vigorous prosecution of our work, and a larger fulfilment of the wide mission for which we were organized. In the effort to secure this, every Fellow who feels an interest in the Society can be of direct assistance.

It should not be difficult for every Fellow to secure an additional Fellow, and send in his or her name for nomination.

It is very gratifying to note that some of the Fellows are doing this now. Such work will most effectively supplement the work of the Council.

Nor can I refrain from inviting the attention of our Fellows to the advantages of enrolling a son or a daughter as a life Fellow in the Society.

To make our influence more widely felt, we need a membership of representative men, covering the entire country. Efforts to increase our Fellowship in this direction will be especially valuable.

I think, also, that we can with advantage form an additional grade of membership in the Society, with similar though more advanced qualifications than those required for our present Life Fellowship.

Such a grade would afford an opportunity which I believe would be utilized by a number of those interested in the work of the Society.

With increased membership and larger income, I hope to see a definite exploration fund established, to be expended with the approval of the Council, under the direction of an advisory committee.

It is for us to *initiate* as well as urge, encourage, and approve work in our field. No matter how much or how valuable work a geographical society may do in other directions, if it fails to accomplish actual work of exploration it fails to exercise its full functions.

In a social direction we can extend our influence advantageously, and solidify our membership, by an annual dinner or reception, or both, during the winter; and by an appropriate meeting during the summer.

Next season a series of informal illustrated talks in our own auditorium, alternating with our stated monthly meetings in Mendelssohn Hall, could be made instructive and interesting, and would form an agreeable and valuable intermediary between the social and scientific phases of the Society.

In connection with our medals, the capacity of our Society for encouraging geographical work would be distinctly enhanced if we had one or two second-class medals available for award to travellers, explorers, or other workers in the domain of geographical investigations who have accomplished good work and yet whose work is not of a magnitude or importance justifying the award of either of the two great gold medals of the Society.

No large sum would be required either for the initial cost of such medals, or to provide for their annual award.

The Geographical Work of the World in 1904.

The most salient geographical event in this country during the past year was the meeting of the Eighth International Geographic Congress in September.

This was the first meeting of the Congress in this country, and the assembling of many eminent geographers from the principal countries of the world has resulted in a pronounced stimulus to geographical work and interest here.

It is impossible to attempt even a summary of the work of the Congress.

Four commanding resolutions were passed by the Congress, as follows:

(1) Urging upon the attention of geographers the mapping of

the world on a scale of 1:1,000,000, as proposed by Prof. Penck, of Vienna, at the Sixth Congress;

(2) Approving polar exploration, and commending north polar work to this country, proposed by Sir John Murray;

(3) Appointing a committee to consider a world census;

(4) Regarding methods in oceanography.

UNITED STATES.

In the United States the work of the Coast and Geodetic Survey and the Geological Survey is being carried on steadily. The extent of this work is such as to make it impossible to note it here. The annual reports of these surveys contain it in full.

An interesting map in Bulletin 201 of the Geological Survey, shows the extent to which our wide territory is now brought under survey control by astronomical positions and primary triangulation.

Another subject of much importance to the West is the reclamation of our arid regions. A reconnaissance survey for this purpose was commenced in 1888. The reclamation service was organized in 1902, and work was commenced in 1904.

The projects approved, for which funds are assigned, contemplate the reclamation of some two million acres—an area nearly equal to that of Delaware and Rhode Island combined. Other projects for future consideration cover millions of acres additional. The funds for this work are obtained from the sale of public lands, and these funds amount at present to some twenty-three million dollars.

An idea of the meaning and value of this work may be gained from the fact that land reclamation in the Nile Valley is estimated to have added some three hundred million dollars to the valuation of Egypt.

The origin and character of these reservoir surveys are described in the twentieth annual report of the United States Geological Survey, Part 4.

The Geological Survey has recently begun the resurvey, on a larger scale, of a number of mining districts, the present stage of development making more detailed maps necessary in the transfer of property and other details of business.

Another problem affecting wide and large interests, and one that bids fair to be perennial, is the control of the Mississippi.

The Statistical Atlas of the United States, issued by the Twelfth Census, is worthy of note, and is unique in its completeness and convenience.

Coming nearer home, the Barge Canal across New York State is a project of great interest to this city.

With a length of 350 miles, an estimated cost of 101 million dollars, capacity sufficient for one thousand ton barges, and an estimated annual tonnage when opened of 10 million tons, this canal is the largest project yet undertaken by any State.

It ranks greater than the great foreign ship canals of Manchester, Kiel, and Corinth. It is comparable in estimated cost and traffic to the Suez Canal, and is second only to the canal at Panama, of which, when completed, it will be a direct feeder, *via* New York City.

There is food for thought for the residents of New York City, in the investigations of Mr. Tuttle, indicating that since 1875 the coast in this neighbourhood is sinking at the rate of 1½ feet in a century.

ALASKA.

Turning to Alaska, it is but little more than a year (October 20, 1903) since the final adjustment of the Alaskan Boundary Question. It is not necessary to go into the details of this. The decision reached by the Tribunal was satisfactory to this country, and the adjustment removed a source of irritation between the United States and Great Britain which had existed for more than thirty years.

Another important step in Alaskan progress is its connection with the United States by cable during the year, and the extension of the telegraph and wireless lines in the country. The system comprises 2,079 miles of cable, 1,439 miles of telegraph, and 107 miles of wireless line. Some of the cable is laid in a depth of 1,700 fathoms.

A cable or wireless line across Bering Strait, and 1,500 miles of telegraph in Siberia, would connect Asia with America.

As regards the mapping of Alaska, the map of that region, on a scale of 39 4/10 statute miles to an inch, which will be issued soon by the United States Geological Survey, will mark a turning-point.

The surveys of northern Alaska by Messrs. Peters and Schrader, published in the Geological Professional Papers, Number 20, 1904, carried a belt of scientific exploration through central Alaska to the Arctic Ocean.

Mount McKinley, the culminating-point of North America, remains still unconquered. Dr. F. A. Cook, one of our Fellows, attempted its ascent, and, though he did not reach the summit, he attained the height of 11,400 feet, and made the entire circuit of

the mountain. It is reported that another attempt is in contemplation for next summer.

NORTH AMERICA.

North of us, the Canadian Geological Survey is continuing its work, largely in the Yukon District.

The Canadian Government has been active in exploiting its Arctic domain during the past eighteen months, though more in a political and commercial than a geographical mood. The *Neptune*, chartered for the purpose, wintered in Hudson Bay, and visited the northern lands as far as Cape Sabine, 78° 42′ N. Lat. The *Gauss*, purchased from the German Government, is now engaged in the same region.

The Government is continuing current observations along the southern and eastern shores of Newfoundland.

These activities are largely due to their bearing on the cherished project of a short northern sea route *via* Hudson Bay to Canada's great western grain country.

South of us, in Martinique, the aftermath of the Mont Pelé catastrophe, the so-called obelisk, and other phenomena continue to attract the interest of scientists and geographers.

SOUTH AMERICA.

In South America we have a continent which in wealth of natural products, in capacity for development, in possibilities for the future, equals, and perhaps surpasses, Africa.

That there is not the same activity there as in Africa is due to the smallness of the population (South America being the least densely-peopled of any of the continents) and the fact that the territory has for a long time been all pre-empted.

A new boundary between Brazil and Bolivia was established by treaty on December 28, 1903, amounting practically to the purchase by Brazil of some 73,000 square miles of valuable rubber territory for $10,000,000 and other valuable considerations, and thus the long dispute over the possession of the large territory known as the Acre was finally adjusted.

This was a question concerning the great rubber centre of the world, this region of southwest Amazonas, owned by Brazil, Bolivia, and Peru, and furnishing nearly two-thirds the total output of the world, valued at about $100,000,000.

Explorations are continuing in Peru, Bolivia, and Brazil, Chile and Argentina, more particularly in connection with developing the capabilities of the rivers and exploiting their valleys; and in

settling and defining boundary questions, which, as rubber and other natural sources of wealth become known and accessible, become of great importance.

Another boundary dispute, that between Brazil and British Guiana, was settled in June last by the King of Italy as arbitrator.

In connection with the boundary surveys to determine the frontier between Argentina and Chile attention may be called to Sir Thomas Holdich's interesting and valuable work on "The Countries of the King's Award."

Professor Hans Meyer has been studying the glaciation of the Ecuadorian Cordilleras, including Chimborazo, Cotopaxi, Antisana, and other peaks, with gratifying results.

The geodetic work in Ecuador, under French observers, is still being carried on, comprising triangulation, levelling, and some pendulum observations.

In Bolivia the French Expedition under MM. Créqui-Montfort and De la Grange has made surveys and studies of Lakes Titicaca and Poopó.

A Government report gives eight routes over the Andes in Peru.

On one of these (The Oroya R.R.) the summit elevation of 15,680 feet is the highest in the world.

An interesting project is the Pan-American Railway, the great north and south trunk line, which, in connection with existing railways, will form a continuous all-rail route from New York to Buenos Aires, a distance of 10,471 miles. Of this distance, 7,162 miles are already completed, leaving some 3,309 miles, in various detached sections, yet to be built. This is one of two great north and south rail-routes (one in each hemisphere) now attracting attention. Hitherto the great all-rail routes of the world have been following parallels of latitude; in other words, running, in general, east and west. Now they are beginning to follow meridians.

EUROPE.

Geographical work in Europe is of necessity one of detail and careful scientific development, including the minute study and classification of coast-lines; the determination of changes and their causes; studies of former glaciation limits; studies of the movements of sand-dunes; of the exact limits of tree and other vegetation; earthquake observations; meteorology; tree-planting, etc.

Limnology, the detailed study of lakes, has been general, and is an interesting branch of investigation, Work in this direction has been carried on in Scotland, Switzerland, Hungary, Italy, Prussia,

and Russia. No better examples of this work can be given than the bathymetrical surveys of Sir John Murray on the Scotch lakes, and the similar work of Forel in Switzerland.

In Austria continued earthquake observations show the frequency of shocks to be less during the past year than in any previous year. It is interesting to note that in Austria is the only double seismological station—*i.e.*, one at the surface and another 3,600 feet below in a mine-shaft.

In Russia pendulum observations carried on for the past five years are giving valuable results.

A report on Belgian Waterways gives one mile of these for every eight and a half square miles of territory. Eighty per cent. of these waterways are directly controlled by the State, and an average of three and a half million dollars annually have been expended upon them for the last twenty-five years.

Partsch and other explorers have been studying the glaciation of the Carpathians and neighbouring mountains with interesting results.

The Survey Atlas of England and Wales is one of the most conspicuous cartographic works yet carried out, and is based on the British Ordnance Survey recently completed, the most exhaustive survey as yet made by any country.

ASIA.

In Asia, the greatest of the world land-divisions, including as it does the so-called "Roof of the World," the two regions of special interest are the plateau of Tibet and the Himalayas; and the northern coast of the continent bordering the Arctic Ocean. Tibet and Lhasa, the hitherto mysterious portion of Asia, are now, as the result of the English expedition to that country, no longer a mystery—are no longer forbidden. The Workmans have been busy in the Himalayas; Profs. Davis and Pumpelly and Mr. Huntington have been doing work in central Asia to the southwest of Tibet. About Lake Issik-Kul, Prof. Davis and Mr. Huntington found conditions reminding them of our Salt Lake region in Utah. Our Mr. Nichols penetrated to within nearly a hundred miles of Lhasa, only to meet his death from pneumonia.

The long-standing controversy as to Mts. Everest and Gaurisankar has at last been settled, with Mt. Everest proved not to be identical with Gaurisankar, with which it has so long been confused.

The Russian Caspian Sea Expedition should promise valuable results, but no recent news has been heard in regard to it.

Our American traveller, Mr. Oscar T. Crosby, has made a journey in Turkestan and across the northwest corner of Tibet.

The results of the Russian expeditions to Lake Balkhash and Kosso-gol and examinations of the Sea of Aral, indicate that these bodies of water in central Asia are rising, showing in this a marked contrast to some of the lakes of Africa, which for years past have been gradually contracting.

Turning to the Arctic coast, we find a railway project under consideration from the mouth of the Obi River to the vicinity of the Gulf of Pechora, to obviate the difficulties of ice-navigation through the Kara Sea, and enable the commerce brought down the great Russian rivers to be transported to Europe by the less uncertain voyage through the White Sea.

Surveys are also being made along the Murman coast; and it is perhaps possible that later, after peace has been declared in Asia, the entire matter of the Northeast Passage, which within the last year attracted some attention as a possible route for a fleet from European to Pacific waters, may be investigated thoroughly throughout the entire extent of coast which thus far Nordenskjöld is the only navigator to have traversed.

AFRICA.

Of all the great world-divisions the one in which there is to-day the greatest activity (though in the line of development rather than exploration, for the latter is largely a matter of the past), and the one which possesses largest interest, is Africa.

Portioned out as it is among the principal European nations, each one's parcel serving as a market for its products, and perhaps in the future a home for its surplus population, we see going on there simultaneously and with great activity, and on a large scale, under a diversity of national and racial methods, the processes of development, of civilization, of empire and commerce building.

In this continent only two explorations on a large scale were carried out or reported on during the past year. One of these is Chevalier's expedition and the important discovery of the phenomena of desiccation now in progress in the Central Sudan.

The other is Lenfant's journey in the Lake Chad region, in which he proved the existence of water connection during the rainy season between that lake and the Atlantic Ocean *via* the Niger system.

Long journeys of exploration in Africa are now supplanted by more detailed studies in small areas, and these studies are constantly improving our mapping of Africa.

The British have completed the detailed survey of their coast of the Victoria Nyanza, the northern half of the shores of the Lake. The German surveys are in progress along the southern coasts; and when these are completed, we shall have a detailed map of all of the shores of the Lake, and the best map of the Victoria Nyanza will have been produced.

One of the most significant features of the development of Africa is the sinking of artesian wells by the French Military Department of the Sahara, to secure water for the irrigation which is now being extensively carried on in the Algerian Sahara and, to some extent, in the desert farther south.

It has been known for years that wide areas of water underlie the desert surface. All the oases lie in depressions of the surface, so that the water in some places comes to the top and in other places it may be reached by digging.

It is asserted by the French officials that the areas which may be reclaimed will probably support a population of 1,000,000. It has been satisfactorily proved that these waters come from the slopes of the Atlas Mountains in the north and from the Ahaggar and other ranges of the Central Sahara, which are favoured with regular summer rains. The water sinks to impermeable rock strata and makes its way for long distances under the desert surface.

Attention has been attracted during the past year to the rapid progress of Saharan exploration by the new methods of desert travel introduced by the French.

Up to two years ago French caravans used the ordinary slow camels of the desert, heavily laden with food and water supplies, and ammunition and guns for defence against the Tuareg nomads. The French found that the Tuaregs, who always escaped after their forays, picked their camels and trained them so that they cover from two to three times as much ground in a day as the ordinary pack camel.

The French enlisted the best camel-drivers of the north, ransacked all the camel herds of the Algerian Sahara, and trained selected animals to get over the ground with a lope that leaves the ordinary caravan train far behind.

The French army of the Sahara now carries no baggage train; but each camel is lightly loaded with supplies, the parties replenishing their commissariat at the oases they reach. The Tuaregs, being unable to escape from these expeditions, have been so severely defeated in their homes among the Ahaggar Mountains that they are no longer a serious menace to desert commerce.

The French, within the past two years, have sent swift expeditions to the Ahaggar Mountains in the south and far towards Timbuktu in the southwest, finding new sources of pasturage and water supply and making other interesting discoveries.

The growth of railroad-building in Africa has been rapid since 1890, and there are now about 14,250 miles in operation. The railroad to Victoria Falls on the Zambezi has been completed, and there is now a direct route from Cape Town to Victoria Falls, 1,644 miles. A permanent hotel is now being built at the Falls, which are more than twice as high as Niagara and a mile in width, affording a scene of wonderful beauty and grandeur, which cannot be observed, however, in its entirety, from any one point of view.

This is the place where the British Association for the Advancement of Science will hold its annual session this year, the first great scientific body to meet in Central Africa.

The French have completed their railroad in Senegal from the head of navigation on the Senegal River to the Niger River at Bammako. During the season of high water in the Senegal there is, therefore, now steam transportation from the Atlantic Ocean for about 600 miles east to the Upper Niger.

Trains have for several years been running regularly between Wady Halfa on the Nile and Khartum in the Anglo-Egyptian Sudan; but Khartum will soon have a more convenient outlet to the sea. Work on the new railroad is now in progress at both ends, along the old caravan route between Berber on the Nile, and Suakin, the best port on the Red Sea; and when it is completed Khartum will be separated from the sea by only 470 miles of rail routes.

Another important project is that between Stanleyville and Ponthierville on the Upper Congo, only 75 miles long, but circumventing the rapids which obstruct navigation above Stanleyville. Four thousand Congo blacks and 170 whites are now building this road, which will be completed about the end of the present year. There will then be uninterrupted steam transportation by rail and river from the Atlantic, 1,640 miles up the Congo.

The so-called "Cape to Cairo" railway project will, when it materializes, traverse Africa from north to south, connecting Cape Town with the Mediterranean by a rail route of some six thousand miles.

Existing railways in Egypt and South Africa furnish an available mileage for something over half this distance.

The past year has witnessed the beginning of colonizing experiments among the highlands of East Africa. Several hundred colo-

nists from Great Britain have settled on the Kikuyu plateau south of Mt. Kenia, about 6,000 feet above the sea, where they are opening farms and lands allotted to them by the Government.

These places are among the portions of tropical Africa that are destined some day to become centres of white industry and civilization.

AUSTRALASIA AND THE PACIFIC.

In Australasia and the Pacific it is interesting to note that the new Pacific cables are being used to revise Pacific longitudes.

In Tasmania recent investigations give indications of ice-sheet glaciation at low altitude in a latitude similar to that of Madrid.

The ownership of Marcus Island in the Pacific, at one time in dispute between Japan and this country, has been settled in favour of the United States.

OCEANOGRAPHY.

In the realm of the oceans (whose area is nearly three times greater than that of the land), where the observer gropes his way blindfolded, the field has only begun to be exploited, in spite of the work of Sir John Murray and others, and no one knows what undiscovered deeps may yet be found, what unknown forms of life may be brought to light.

In this field the Admiralty Expedition to the Indian Ocean, for the purpose of carrying on surveys there on the plan of the *Challenger* Expedition, is of conspicuous importance.

ARCTIC REGIONS.

Turning now to the extremities of the earth, the Polar regions, it is my sad duty to note in the Arctic the death of Baron Toll, who started from the New Siberian Islands, south for the mainland with his drivers, and has not been heard from since.

Amundsen, in his little craft "Gjöa," is, according to a letter reported to have been found by a whaler on Beechey Island, somewhere in the waters of Lancaster Sound, in his search for the magnetic pole.

The Danish expedition which crossed Melville Bay and spent the season among the Eskimo of Whale Sound, where they were seen by the whalers, retraced their steps on snow-shoes across Melville Bay to the Northern Danish settlements, and returned home.

Mr. Ziegler's expedition under Mr. Fiala is still in Franz Josef Land, though no news has been received from it, the attempts to communicate with it last summer having been rendered abortive by the heavy character of the ice.

Mr. Ziegler has recently purchased the *Terra Nova*, one of the relief ships of the British Antarctic Expedition, for a relief ship for next summer, when the Fiala party will undoubtedly be reached and brought home. There is little reason for anxiety in regard to them, as they were amply provisioned, and the fact of their non-return last summer does not necessarily mean anything serious.

The proposed expedition of the Peary Arctic Club of this city is probably familiar to most readers. The new ship for this expedition is now being built at Bucksport, Maine, and, when completed, will be the most powerful ship yet constructed for Arctic navigation and discovery. It is proposed that the Club's expedition shall start north next July.

In France, M. Bénard and the Prince of Monaco are considering an expedition which shall utilize the drift method of approach to the Pole. This plan contemplates two ships entering the ice farther to the east than did Nansen, and thence drifting over or near the Pole.

ANTARCTIC REGIONS.

In Antarctica the year has been marked by the return of all of the expeditions which, during the past two or three years, have been emulating each other in securing additional information in regard to the lands and seas surrounding the South Pole.

The efforts of these expeditions from Great Britain, Germany, Sweden, and Scotland, have made the past three years an era of unusual activity in Antarctic work.

Briefly summarized, the British Antarctic Expedition in the *Discovery*, under Captain Scott, utilizing the Victoria Land of Ross, south of New Zealand, and wintering two years under the shadow of Mt. Erebus, attained by far the highest southing, 82° 17′ S. Lat., and saw mountains extending to 83° S. Lat.

The German expedition in the *Gauss*, under Dr. Drygalski, discovered a new point in the periphery of the Antarctic Continent, near the Antarctic Circle, and during one season made valuable biological collections and magnetic and meteorological observations.

The Swedish expedition in the *Antarctic*, under Dr. Nordenskjöld, had the misfortune to lose its ship, but the party wintered on islands of the Graham Land group, south of Cape Horn. The expedition was out two years, and the discovery of a fossil flora and fossil bones of mammals opens up a new horizon in Antarctic investigation.

The Scottish expedition, under Mr. Bruce, in the *Scotia*, made

two voyages in successive seasons, and has located one more point in the circumference of the south polar land, east and south of the Graham Land group.

There remains now in that region only the French expedition, under Dr. Charcot, which sailed last summer.*

As far as I am aware, it is not the present intention of these various nations to continue exploration in that region, the *Gauss*, *Terra Nova*, *Morning*, and *Discovery* having been sold, and the *Antarctic* lost.

An unusually favourable opportunity is, therefore, presented for this country to take up the work where it has been left, and, profiting by the experience and discoveries of our friends across the water, and utilizing methods and equipment which we have ourselves developed in recent years of Arctic work, carry the problems of Antarctic exploration and discovery to their legitimate conclusion.

Prof. Penck, in his summarization of the results of these various expeditions, notes that present indications point to a *seventh continent* about the South Pole, with an area equal to that of Europe, and an interior presenting conditions similar to those of Greenland.

Such a land-mass with such an interior, would present ideal conditions for the utilization of methods of ice-travel, developed in the north during the past twelve years, and would almost insure that a properly-equipped two-ship expedition sent out from this country, would attain the South Pole itself.

THE UNKNOWN.

I have touched briefly upon the work of exploration and development now going on in the world. Our maps have made us familiar with the known portions of the earth; let us look for a moment at the unknown portions. Comparatively few, it is true, and steadily decreasing, but still existent. Areas in every continent but Europe.

It is only at the Poles that great areas still remain absolutely unknown to the explorer and scientist, and the popular conception of these regions is almost as far from the truth as were the ideas of the early Phœnician navigators in regard to the terror-haunted regions beyond the Pillars of Hercules.

About the North Pole is an area of approximately 3,000,000 square miles—roughly speaking, of the size of the United States or Australia or Brazil; while round the South Pole is an area nearly three times as large—larger than South America.

* Dr. Charcot's Expedition returned to Argentina March 5. The winter was passed in work in Palmer and Graham Land, south of Cape Horn.—R. E. P.

These regions stand to-day as a challenge and spur to every geographer, to every geographical association, and to the man in each of us.

Dr. Hugh Robert Mill, one of the foremost British geographers, in a recent able address on the "Present Problems of Geography," says:

> To begin with, the ground should be cleared by wiping off the globe the words "terra incognita." Such unknown parts of the earth now cling about the Poles alone, and that they should even do this is something of a disgrace.
>
> The other residual problems of exploration and survey are in the same case. If those who control money saw it to be their duty to solve them, they would all be solved.

I most heartily endorse Dr. Mill's statements.

In the coming chapters of this record of achievement and progress and growth let us hope that our Society will be in the front rank.

Remembering its initiation and urging of the work of a State survey in the past, the Society can repeat that action on a larger scale by urging upon the National Government the desirability of taking up Antarctic exploration where our friends across the water have left it and, profiting by their experience and results, pushing it to a splendid conclusion, and enriching our museums and our studies with a mass of new and valuable material from that yet practically unknown region.

Such a project could be urged by none better or more appropriately than this Society—and it could be urged with more than ordinary chances of success. Such action is not only the privilege but the duty of a Society such as ours, and there is no present project of larger or wider geographical interest than the one I have indicated. At the Poles alone to-day is it possible to do great pioneer work in geography.

There is another thing which, while it may seem to some an impracticable dream, is not so, and which I should like to see realized —namely, that this Society, located in the maritime centre and largest city of the Western Hemisphere, should possess a ship of its own, not large, not expensive, but capable of floating the Society's pennant in any sea on the globe.

There is no other one way in which we can more effectively take lead among geographical societies, and widen the boundaries of information in our field, than by having such a ship of our own, which, every year, under the direction of the Society, should carry on original scientific investigations in some quarter of the globe.

As I have stated, such a ship need not be expensive, and it would be possible to reduce the cost of maintenance to a nominal sum.

of oak or pine forests. The rubber trees are scattered among other kinds of timber, and form only a small percentage of the trees. The whole basin, especially the southern part of it, is covered with limitless forests, with only here or there a campo or plain of comparatively small extent.

The methods of collecting rubber from the *Hevea* and the *Castilloa* have been briefly described in the BULLETIN (Vol. XXX, pp. 275–276). The reader who desires exhaustive details is referred to Mr. Ule's pamphlet. In brief, the rubber-collector can care for about 200 *Hevea* trees, collecting sap from half of them on one day and from the other half on the next day. The season covers the drier months, from May to October. Every morning the workman goes from tree to tree, making short incisions with a small hatchet. Under each incision he presses the sharp lip of a tin cup in which the sap is caught. The wound soon heals, and *Hevea Brasiliensis* yields annually for four or five years, when the tree is given a year's rest.

Castilloa, which yields caucho or caoutchouc, is also widely distributed, but there is danger of its being exterminated, as the tree is destroyed in order to obtain the milk.

The transportation question is very important. On some of the smaller rivers rubber cannot always be transported, even by canoe, and it is necessary for men to carry the loads on their backs for short distances. But the product is carried to great trading-points like Manaos and Pará only by steamboat, and there is regular steam traffic on all the larger rivers where rubber-collecting is important.

Manaos is the collecting-point for the central and upper basin, while the rubber of the lower river and its two great tributaries, the Tapajoz and Xingú, is tributary to Pará. In 1880 the total rubber yield of the Amazon Basin was only 8,680 tons. Ten years later the product had almost exactly doubled; and in 1900, 8,937 tons were shipped from Manaos and 17,812 tons from Pará, or 26,749 tons from the Amazon Basin in a total world product of 51,001 tons. It was not till 1901 that the development of rubber-collecting along the great rivers tributary to Manaos enabled that city to surpass Pará in quantity of rubber prepared for market. Since that time Manaos has kept well ahead of Pará in this trade. In 1903 the exports from Manaos were 18,277 tons; from Pará, 12,817; from the Amazon Basin, 31,094 tons, or more than half of the world's product, the total output being 61,759 tons.

For the five years ending with 1903 the annual yield of caucho, or rubber, from the *Castilloa* amounted to from 3,247 to 3,906 tons,

while the production of rubber from *Hevea* varied from 13,469 to 16,546 tons.

The central and upper Amazon Basin are now the most important fields of rubber production. It is interesting to observe the relative importance of the various rivers in production. In 1903 the upper Amazon, with the Javary and the streams above Iquitos, yielded 4,130 tons; the Juruá, 4,537; the Purús, 7,395; the Madeira, 2,963.

Various attempts have been made along the Amazon to form plantations of *Hevea* trees. These experiments have not been very successful, and the fact has been chiefly ascribed to the comparatively high price of labour and the inability of the planters to give adequate care to the young trees. There seems to be no doubt, however, that rubber trees may be successfully raised on Brazilian plantations. Experiments show that a tree of *Hevea Brasiliensis* in a well-kept plantation will yield within fifteen years after planting, while a tree in the forest requires twenty-five years.

The fact is now well known that many comparative experiments in tropical countries with some or all of the established rubber plants have demonstrated the superiority of *Hevea Brasiliensis*. One of the latest accounts is from Mr. W. H. Johnson, Director of Agriculture on the Gold Coast, West Africa, who reports that experiments in the botanic gardens at Aburi were unsuccessful with West African, Ceará, Assam, and Central American rubber plants. Fairly satisfactory results were obtained with the indigenous *Funtumia elastica;* but *Hevea* excelled in quantity and quality of rubber and in its rate of growth, and has been remarkably free from insects and fungus pests.

TOPOGRAPHY AND TRAVEL IN PENNSYLVANIA.

BY

WALTER S. TOWER.

The earliest lines of travel in Pennsylvania, Indian trails, and tracks through the wilderness took little heed of surface form. On the old maps many trails may be seen running directly across steep mountain ridges and through deep valleys, with no apparent attempt to seek out the easiest routes. To-day the more improved modes of travel seem to be less independent. Throughout the State, both highways and railroads are directly controlled by the topographic conditions of the region.

Pennsylvania may be divided, on the basis of general features, into three main topographic districts, each one quite different from the others, and together presenting a variety hardly equalled in any other State. The three districts are: (1) the southeast district, a region of small relief; (2) the central district, a region of parallel ridges and linear valleys; and (3) the western district, a region of many streams and steep-sided valleys, with intervening even-topped hills. When each of these districts is considered in detail it is seen that as the topography varies the conditions of travel also vary.

The southeast district includes the area south and east of South Mountain, together with the region lying between South and Kittatinny or Blue Mountain, commonly known as the Cumberland or Great Valley. In comparison with the rest of the State, this district is a region of small relief; it is not a plain, however, in the strict sense of that term, being characterized throughout by a rolling topography of varying altitudes. When studied in detail there appear to be three divisions of the district: (1) The lowland areas, represented by the Great Valley, the Chester Valley, and the Lancaster plain; (2) the extreme southeastern belt of low hills in Philadelphia, Delaware, and Chester Counties; and (3) the range of hills known as South Mountain, extending from the Delaware River at Easton southwestward to Reading, where they die down not to appear again until the Susquehanna River is passed in York and Cumberland Counties. In each one of the smaller divisions the topography is characteristic and exerts its controls over travel.

Throughout the Great Valley, the Lancaster plain, and the other lowland areas the surface is that of a gently-rolling or undulating plain; streams are many, but there are no deep valleys, and though the surface is far from level, hills of any prominence are few and scattered. Over such a region travel moves with equal facility in all directions. The highways often present a rectilinear pattern, being parallel to, or at right angles to, the undulations. They usually represent the shortest distance between the different points of communication, and over a given area they reach a maximum value of mileage, averaging even in some of the less populated parts two and three miles of highways per square mile of area. Railroads, likewise, find nothing to restrict their direct routes. There are few steep grades to be climbed, few cuts to be made, and few valleys to be bridged. The several lines radiating from Lancaster, from New York, or from Lebanon all show the freedom of communication which exists.

In the area of low hills beginning to the north of Philadelphia

and extending southwest into Chester County there are no great elevations, the relief rarely exceeding 200 to 300 feet; steep slopes and cliffs are generally absent, and the whole contours take on a softened, rolling outline. The conditions are much like those in the lowland areas. Travel by highways is unrestricted; no slopes are so steep as to be forbidding, and no heights are so great as to make detours easier or more economical. Away from the larger towns there are often two or three miles of road per square mile of area. The railroads, however, find the conditions a little less free. Where convenient stream-courses offer easy grades along their banks, the railroads follow the streams, as in the case of the two main lines along the Schuylkill, and the smaller lines along Darby, Chester, and Brandywine Creeks. The main line of the Pennsylvania Railroad, however, finds it more economical to save distance even at the expense of numerous cuts and bridges, and hence runs out across country to the level region of the Chester Valley.

In the South Mountain belt there is not, as in the case of the other mountains of the State, a solid, steep-sided, even-crested wall of rock, but rather a broken chain of detached hills of varying height and extent. Few of them are continuous elevations for more than a mile, being generally rounded rather than linear, and few of them rise more than 600 or 700 feet above the level of the surrounding country. The control of travel is more marked here than in the other two areas. The highways can, and in many places do, run across country, irrespective of the hills that intervene, but by far the greater number of them swing around the hills, keeping to the lower levels and seeking the lower divides, even at the expense of greater distances to be travelled. The relief is great enough to make many routes impossible for the railroads. The degree to which the country is intersected by streams results in there being no continuous, easy slopes, except along the winding-stream valleys; and in them the railroads are compelled to locate. In the fifty miles from Easton to Reading the South Mountain belt is crossed but twice by the Bethlehem and Allentown branches of the Reading Railroad, both of which are single-track lines, and are compelled to follow up the creek to cross over to another descending on the other side. On the Allentown branch a tunnel a half mile long is necessary to get from the headquarters of the Perkiomen to the valley of Little Lehigh Creek.

In the same way the south prong of the South Mountain, in

York and Cumberland Counties, is crossed but once in its extent of forty miles in this State by the road from Carlisle to Gettysburg, which follows up the valley of Mountain Creek to descend on the south by the valley of the Conestoga. Thus, in the southeast district there is the open communication of the Great Valley and the lowland areas; the beginning of restriction in the southeastern belt of hills, and the still greater restrictions in the South Mountain belt.

For the sake of direct comparison, let us pass next to the western district, which may be considered as including all the area west and north of the Allegheny Mountains. In this district the relief is everywhere great, and though the hills, viewed from a distance, present the effect of a generally uniform level, the difference between the upland level and the valley bottoms is often 1,500 feet. The slopes are often steep; cliffs are not infrequent, and many of the valleys are of the character of narrow, steep-sided, V-shaped ravines. The streams and their tributaries are numerous and ramified, which, together with the narrow character of the valleys, results in there being neither continuous stretches of unbroken upland nor extensive areas of lowland. Though the conditions of actual elevation above sea-level, amount of relief, etc., vary here and there in the district, the controls of travel are so similar throughout that it may be regarded as a unit.

The first interesting feature is the control exerted by the Allegheny Mountain, the eastern boundary of the district. The Allegheny Mountain, which is really only the southeast-facing escarpment of the plateau lying to the west, extends almost unbroken in a long, sweeping curve from the Maryland line in Somerset County to within twenty miles of the northeast border of the State. It is a wall of rock about 2,000 feet high, and in its extent of 230 miles in this State it is broken only by the narrow gorges of long cañons, through which flow the northwest branches of the Susquehanna River. These branches are six in number, and are located mainly near the eastern end of the mountain; in order, westward, they are the North Branch of the Susquehanna, Muncy Creek, Lycoming and Pine Creeks, West Branch of Susquehanna, and Beech Creek. South from the gorge of Beech Creek the mountain is unbroken as far as the Maryland line, but is deeply notched in its crest by several short ravines.

These six ravines offer the only avenues of communication with the northwestern part of the State and between central Pennsylvania and New York State. Each one of them is occupied by a

railroad, the lines from Williamsport to Elmira along the Lycoming and from Lock Haven westward along the West Branch being the most important. South from Beech Creek the Allegheny front is crossed but five times by railroads in the hundred miles to the Maryland line. Four of these lines are between Beech Creek and Gallitzin, three short coal roads, and the main line of the Pennsylvania Road to Pittsburg. In each case the ascent is made at the only points where the crest is notched by short ravines, and even then the roads are forced to maintain steep grades. In the case of the Pennsylvania Road the ascent from Altoona at the base of the mountain is made only by means of the famous "Horseshoe curve" and heavy grades to the tunnel at Gallitzin, several hundred feet below the crest of the Front. From Gallitzin to the Maryland line, about forty miles, there is but a single notch in the crest, the one occupied by the Baltimore and Ohio on its way from Cumberland over to Pittsburg. To make this ascent at all such heavy grades are necessary that extra engines are detailed to help the traffic over that portion of the road; and for this work the largest engine in the world has been built recently. Both the notch at Gallitzin and the one occupied by the Baltimore and Ohio are located opposite westward-flowing streams, the Conemaugh and Castleman Rivers, which afford comparatively easy routes through the hilly country to the west.

In all the region that lies beyond the Allegheny Front the movement of travel is almost entirely dependent on the occurrence and extent of stream-courses. Over thousands of square miles hardly a mile of railroad can be found which does not faithfully follow the course of some stream, large or small, as the Allegheny, Monongahela, Conemaugh, Kishiminetas, Red Bank, and a host of others. The reason lies plainly enough in the dissected character of the country; a region broken by ramified streams into an endless variety of detached hills, with many deep valleys, whose narrow floors or sloping sides offer the only continuous levels for railroad-building. The absence of large streams, and consequently favourable routes, has left tracts of hundreds of square miles in the midst of the bituminous coal regions still unentered by railroads.

The highways, also, are almost without exception located in or along the valley bottoms or sides. Some few roads gain the hilltops, and run from one to another in a winding course for several miles, but they for the most part follow up one ravine to the lowest divide and descend by the opposite ravine on the other side. Between any two points the topography determines the direction

of the route. Here the ratio of miles of road to unit of area is at a minimum; in places many square miles of territory are without roads of any kind, or only those of the most primitive sort. The miles of trails and mere tracks leading over the steep hills suggest the conditions of a truly mountainous region.

In sharp contrast with these conditions is the freedom of movement over the narrow Erie lowland, generally level, and of low relief. Over the lowland travel moves at will; and the two great trunk lines of railroads, which utilize it as an easy gateway to the west, run in wonderfully straight lines when compared with the winding and circuitous routes along the rivers in the hilly country near by.

The central district, the last to be considered, lies between the Allegheny Mountain and Kittatinny or Blue Mountain, and is divided into four well-defined topographic areas: (1) the Catskill or Pocono plateau, at the northeastern end; (2) the anthracite coal region; (3) the open country of the Middle Susquehanna; and (4) the mountains of the Juniata region.

After crossing the Delaware River into Pennsylvania, the Catskill Mountain plateau of New York State extends as a high tableland westward over northern Pike, Monroe, and Carbon Counties to the Lehigh River. The whole plateau is a nearly level upland, over which, when once the general level is reached, travel is not difficult. Highways are few as compared with the other parts of the State, mainly because there is no demand for them; but six lines of railroads cross the plateau from the coal fields to reach the seaboard markets. Here, as along the Allegheny Mountain, the lines of railroads ascend and descend the rim by the short ravines that notch it, as Spring Brook and Roaring Brook on the western edge and Lackawaxen Creek on the east.

The anthracite coal fields, perhaps, present the most interesting series of controls of travel to be found in the State. The coal basins are, from their shut-in nature, not easily accessible; but their great mineral wealth demands an outlet, and hence hundreds of miles of railroads have been built where otherwise, probably, not a mile of track would have been laid. The basins are bounded and traversed by a series of parallel and converging ridges, even-crested, steep-sided, and of great linear extent, which rise 1,000 feet above the intervening valleys.

Though the floors of the valleys are far from level, the differences in elevation are comparatively unimportant; and in any given valley the travel both by highways and by railroads is hardly more limited than in the hilly country of the southeast province.

Only when it is a matter of inter-valley communication do the real difficulties appear. Over most of their extent the ridges present solid barriers to transverse travel. In places, however, their crests are lowered either by slight Vs, in a notch a few hundred feet deep, or in narrow gashes all the way down to the level of the neighbouring valleys. The former are known as wind-gaps, the latter as water-gaps. The importance of these gaps cannot be overestimated; toward them nearly all lines of inter-valley travel are seen to converge, and often the larger towns, as Shamokin and Pottsville, are located at these natural centres of communication.

On the south and east the coal basins are shut in by the Blue Ridge and the Pocono plateau, already mentioned. The Blue Ridge, in its extent of 100 miles from the Delaware River to Harrisburg, is breached but three times by the Lehigh River below Mauch Chunk; by the Schuylkill at Fort Clinton; and finally by the Swatara. Not one of these gaps exceeds a quarter of a mile in width, and yet they furnish the only gateways from the southeast through the high rampart of the Blue Ridge to the rich coal fields of Schuylkill, Carbon, and Luzerne Counties. The gap of the Lehigh at Mauch Chunk not only acts as an outlet for the eastern part of the southern coal fields, but also takes a large share of the traffic from the northern field.

The northern field in Wyoming and Lackawanna Counties has a natural outlet both to the west and to the north along the east branch of the Susquehanna River. To the west, however, is away from the markets, and to the north the course of the stream is so winding, and the valley so narrow and steep-sided, that most of the coal roads choose the shorter course, and make the difficult ascent of the Pocono plateau rim to reach the seaboard markets.

In the southern coal fields the problem of travel and transportation is complicated by the fact that each basin has a double rim; that the gaps in the bounding ridges are sometimes not opposite each other, and also not opposite the gaps in the Blue Ridge, or that there are no convenient gaps at all. For example, there is but a single eastern or southern outlet from the Shamokin field—the gap near Mt. Carmel. But the gap in Locust Mountain, the inner rim, is a little over four miles west of the gap in Mahanoy Mountain, the outer wall; while in front of the latter is Broad Mountain, through which no gap is offered. Between the two gaps the railroad has a comparatively easy, if somewhat longer, route in the narrow valley that separates the ridges; but in getting over Broad Mountain it is necessary to follow up the ravine of Rattling Run,

with a grade above Gordon Station of not less than 200 feet per mile, or about 4 per cent. A grade slightly steeper than this is found near Fairview, a few miles south of Wilkesbarre. A 2 per cent. grade, or 100 feet to the mile, is ordinarily considered as the maximum for all regular traffic. The coal roads out from Tremont, near the western end of the field, find their way easily enough through the gaps in Second and Sharp Mountains, only to be met by the unbroken wall of the Blue Ridge, which makes necessary a detour of seven or eight miles westward to Swatara Gap, or about twelve miles eastward to the Schuylkill Gap.

At Mauch Chunk, at the eastern end of the field, near the famous Lehigh Water Gap through the Blue Ridge, there is no break in the sharp rims of the basins where they converge in the high, prow-like termination. It was here that the famous gravity road was operated from the crest of Summit Hill down to the Lehigh Canal. Since then a tunnel three-quarters of a mile long has been driven through Hesquehoning Mountain to the mines in the valley. Other tunnels are found in different parts of the basins, where no convenient gaps exist—one over half a mile long near Mahanoy City, another about the same length near Williamstown, a smaller one at Lofty, a few miles east of Mahanoy City, and so on.

Still another means that is resorted to in getting over the unbroken ridges is the switchback, the best example of which is on the Clark's Valley branch of the Philadelphia and Reading Railroad over Sharp Mountain, from Clark's Valley to the headwaters of the Swatara. The ascent is nearly 100 feet, made in a double switchback about three miles long—six extra miles of road, with heavy grade, to win a way over a single ridge.

From the end of the line in Clark's Valley to Swatara Gap the nearest break in the Blue Ridge is only six miles. In between, however, lie the ridges of Second and Third Mountains, and to reach the gap the switchback is necessary, together with a detour of over thirty miles along the upper Swatara. In other sections, where but a single route is practicable, it may be followed by two or more rival roads, as the Delaware, Lackawanna and Western and the Pennsylvania Railroads, which parallel each other for miles along the North Branch of the Susquehanna; the Lehigh Valley and the Philadelphia and Reading Railroads, along the Lehigh River; or the Reading and the Pennsylvania lines, along the Schuylkill.

Similar difficulties of unfavourable routes, long detours, and heavy grades are met in all parts of the coal fields, and yet hardly any other section of the State has more miles of railroad per unit

of area. So striking is this feature that on any good railroad map of the State the limits and locations of the different fields can be determined by no other guide than the network of lines covering the basins.

The region of the Middle Susquehanna, the third district of the central province, is an open country, with fewer ridges, broader valleys, and generally favourable conditions of travel. Its main interest lies in the fact that its southern edge contains the gateway to the western part of the State, the gap of the Susquehanna where it crosses the Blue Ridge at Harrisburg. But this gap, important as it is, would be of little consequence without a pathway beyond it. For behind the Blue Ridge, stretching away to the westward, lies the great series of parallel ridges of the Juniata region, which, were they not breached one after another by the transverse course of the Juniata River, would offer an insurmountable barrier to east and west travel. The Juniata pathway leads off from the Susquehanna a few miles above Harrisburg, and though its course, winding about through the ridges, necessitates many miles of extra lines for the railroads that follow it, the importance of its existence there at all can hardly be overestimated.

The last division of the central province, the region of the Juniata, is, like the anthracite coal areas, a region of steep-sided, even-crested linear ridges, sometimes parallel, often converging, and separated by narrow longitudinal valleys. The region is completely walled in on the east by the unbroken rampart of the Blue Ridge from Harrisburg south to the Maryland line. In the valleys the main lines of travel are longitudinal, parallel to the ridges. In any one valley communication is open, and each valley is more or less a unit, as shown by single valleys forming counties, like Juniata, Perry, and Mifflin Counties. Inter-valley travel is, perhaps, even more limited than in the northern area, mainly because of fewer transverse streams to give the advantage of gaps. There is, also, not the great economic need for railroads as in the coal fields. A good example of the difficulty of inter-valley travel is afforded by Bedford in the valley of the Raystown Juniata and McConnellsburg in the valley of Sideling Hill, thirty miles to the east. Between them are two unbroken ridges, and the railroads, paralleling the ridges, necessitate a journey of over a hundred miles between the two towns.

When the State is considered as a whole, one can hardly fail to be struck with the remarkable combination of topographic details, which, by a slight change or omission, might have made a vast dif-

ference in the progress and development of the State. The most open communication is on the southeast, where lines can come from all directions to the only port of the State, Philadelphia. The long break in the South Mountain belt gives easy access to the Great Valley, and opens the way to the middle of the State. Three of the four gaps in the Blue Ridge are in that part of its extent lying in front of the coal fields, to which means of entrance is of the utmost economic importance. The fourth and last gap in the Blue Ridge is opposite the break in the South Mountain, and also in such a place as to be an important part of the gateway to the western part of the State. The gaps are absent only in that part of the Ridge where their need is not great. The transverse course of the Juniata offers a pathway through the otherwise unbroken ridges, from the gap of the Susquehanna to the Allegheny Front at a particular place where crossing is impossible. And, finally, on the western side of the Front, the Conemaugh and Castleman Rivers head near the only points where for miles in extent crossing by railroad is practicable, and offer easy routes for the roads through the broken country of the western district.

THE BIOLOGICAL EVIDENCE OF RIVER CAPTURE.*

BY

DOUGLAS WILSON JOHNSON.

Whenever one stream captures a portion of the drainage of a neighbouring stream, certain results are produced which become evidences of the capture which has occurred. By a study of these results we are able to tell much about the former relations of the streams affected, and may even learn the approximate time at which the change took place.

It will readily appear that river capture may produce two different classes of results: first, those which can be produced by nothing else than river capture, and which are therefore to be regarded as conclusive proofs of such capture; and, second, those which can be produced by other agencies as well, and which are therefore not in themselves proof of capture. In the study of drainage modifications in general, and in the study of any particular case of capture, it is a matter of prime importance to distinguish

---

* Abstract of a paper read before the Philadelphia meeting of the Association of American Geographers. The complete paper will appear in "Science," and a full discussion of the Tennessee problem in the Journal of Geology.

clearly between these two classes of results, in order that those who follow our work may fully understand the character of the evidence upon which our conclusions are based.

In the discussion of drainage modifications, different students of the subject have pointed out a variety of evidence leading to the conclusion that capture has occurred. One such line of evidence is that furnished by the distribution of fresh-water shells, which we may term the biological evidence of river capture. Two neighbouring streams may have characteristically different faunas inhabiting them. If a portion of the drainage of one stream is captured by a branch of the adjacent stream, the fauna of the captured one will be mingled with that of the captor. Such a commingling of faunas becomes one evidence of the capture.

This line of evidence has been advanced in support of several cases of supposed river capture, and has been widely accepted as a definite proof of capture. The conclusions arrived at are in some instances far-reaching in their effects, and it would seem very essential to weigh carefully the evidence upon which those conclusions are based. Especially is this true of evidence offered and accepted as conclusive in and of itself.

The biological evidence can be accepted as proof of river capture only if we grant that no other agency can effect the commingling of forms referred to. It is therefore pertinent to ask: Are there any other means for the dispersion of fresh-water shells besides river capture? If so, is there any reason why the shells in question may not have been so dispersed? And is there any evidence of such dispersal elsewhere, under conditions which preclude the possibility of river capture's having been the effective agent?

The first question must be answered in the affirmative. It is known that the young of many of the forms in question possess the power to attach themselves to the feet or feathers of birds, or to insects, or to plants carried away by birds, and that they may thus be transferred from the waters of one stream to those of another. It is believed that they may also pass from stream to stream across the low interstream areas near the sea in times of great floods, or that they may migrate along the shore itself. These and other means of dispersal are considered more in detail in another place, and it is only desired to call attention here to the fact that they exist.

According to those who are most familiar with the anatomy and habits of the special forms involved in the biological evidence as heretofore employed, there is no reason why they should not be dispersed in the ways above mentioned.

That these other means of dispersal are effective is shown by the fact that the same species supposed to prove the capture are elsewhere found inhabiting different streams, far distant from each other, under conditions which make it impossible that river capture should be held responsible for their location. Other similar forms have almost world-wide distribution, inhabiting different continents, necessarily having been dispersed by some of the other agents referred to, or by means concerning which we have no knowledge.

These general facts, which I have elsewhere discussed more fully, compel the conclusion that in its broadest terms the biological evidence of river capture is not conclusive in itself. We must make a careful study of the circumstances of each special problem; note the character of the divide between the two streams, to see whether it is favourable for the transfer of forms across it; examine the special forms under discussion, to see whether they are adapted to the various means of dispersal; ascertain whether those forms have elsewhere been distributed by some agent which could not have been river capture—in short, make a critical test of the evidence before using it.

Such a test has not been made in cases where this line of evidence has been most effectively employed, with the result that evidence, which is shown to be incompetent in the light of the distribution elsewhere of the species involved, has been accepted by many as a proof of river capture where positive evidence now available tends to show that capture did not occur. Thus, the fact that shells especially characteristic of the Tennessee River have been found in the Coosa and Alabama Rivers has been urged as proof that the Tennessee River formerly flowed southward by way of the Coosa and Alabama into the Gulf, and owes its present course to capture near the Chattanooga by a stream from the west. It appears, however, that the divide between the waters of the Tennessee and Coosa basins is low and insignificant, and so situated as to be peculiarly favourable for the transference of the shells from one stream into the other. Furthermore, it is seen that the same shells upon which the argument in favour of capture is based occur in other streams, where it is impossible to suppose that they have been transferred by river capture. If river capture is not responsible for their distribution in these last cases, then it is not possible to prove capture of the Tennessee on this evidence alone. Capture *may* be responsible for the distribution in such cases, but it *need not* be. It is believed that in the case of the Tennessee the distribution must have been effected independently of river capture.

MASSACHUSETTS INSTITUTE OF TECHNOLOGY.

GEOGRAPHICAL RECORD.

AMERICAN GEOGRAPHICAL SOCIETY.

Transactions of the Society, February, 1905.—A Regular Meeting of the Society was held at Mendelssohn Hall, No. 119 West Fortieth Street, on Tuesday, February 21, 1905, at 8.30 o'clock P.M.

Vice-President Moore in the chair.

The following persons, recommended by the Council, were unanimously elected :

To Honorary Membership : Sir John Murray.

To Fellowship :

Harry Skull.
N. A. Bengtson.
Trenor L. Park.
T. T. Eckert, Jr.
Antonio Reynes.
Franklin Delano Roosevelt.
Miss Helen L. Gennert.
Willis Fletcher Johnson.
J. Henry Townsend.
Robert Olyphant.
John H. J. Stewart.
Clement S. Dunning.
Rev. John Howard Raven.
T. Tileston Wells.
W. P. Hardenbergh.
William Church Osborn.
Madison Grant.
Frederic de P. Foster.
William T. Blaine.
William Lee Howard.
William R. Powell.
Robert C. Geer.
John B. Uhle.
Julian Hastings Granbery.
Stephen J. Meeker.
Howard Van Sinderin.
Paul G. Thebaud.
Philip Ruprecht.
H. E. Heath.
Alain C. White.
J. Culver Hartzell.
Robert Peet Skinner.
James P. Hall.
Fullerton Merrill,
Seth B. Robinson.
Edward True Wing.
John E. Whitaker.
William H. White.
Stephen Loins.
George R. McDougell.
George C. Yeisley, D.D.
Peter Zucker.

The Chairman then introduced the speaker of the evening, Mr. Adolphe F. Bandelier, who addressed the Society on The Region of Lake Titicaca. Stereopticon views were shown.

On motion, the Society adjourned.

AMERICA.

Reconnaissance Work in Mexico.—Mr. Robert T. Hill, accompanied by Dr. E. O. Hovey, of the American Museum of Natural History, and assistants, has gone to Mexico to study the geography and geology of the Western Sierra Madre. This reconnaissance work will continue Mr. Hill's investigations upon the mountains and deserts of the Southern Cordilleras, and also Dr. Hovey's studies of volcanic phenomena. The expedition is fully equipped for topographic, photographic, and geologic work.

Great Britain Annexes a Small Island.—According to the *Geographische Zeitschrift* (1904, p. 581) the British annexed in August last the little Aves Island,

in the Caribbean Sea, west of Guadeloupe, in 15° 38′ N. Lat. and 63° 36′ W. Long. It is a low island, rising from a great depth, and has been little known. It stands 12 to 14 feet above sea-level, is visible only near at hand, and is, therefore, a danger to navigation. Its length is only about 4,000 feet. American vessels have taken away most of its guano deposits, and the only value of the island appears to be an anchorage on its southwest side in six fathoms of water.

Marine Biological Laboratory at Tortugas.—One of the research projects authorized by the Carnegie Institution was the establishment of a laboratory for the study of the marine biology of the tropical Atlantic, using Tortugas, Fla., as a land station. Mr. Alfred G. Mayer is the director of the work. The main laboratory and a small laboratory were erected in July last. A staunch sea-going vessel of light draft, capable of making headway against the strong currents of the coral reefs and the Gulf Stream, was launched at East Boothbay, Me., in August. She has accommodations for seven men, is equipped with a full set of trawls, dredges, nets, and other apparatus for the study of marine life, and the cabin has ample room for such laboratory work as can be accomplished at sea. The director says (Year Book No. 3 of the Carnegie Institution) that the vessel has proved to be an able yacht, and displays her best qualities in heavy weather. Every encouragement is to be given to eminent naturalists to pursue their investigations at the laboratory.

The Iroquois Beach in Ontario.—Glacial Lake, Iroquois, was an ice-dammed lake formed when the continental glacier blocked the St. Lawrence outlet and caused the water to rise to the level of the divide at Rome, New York. Its shore-lines are very distinct on both the Canadian and the American sides, where they were early recognized as elevated beaches even by untrained travellers. Much study has been given to these shore-lines of the ancient glacial lakes, and in New York, largely as a result of Dr. Vibbert's careful work, they have been accurately mapped. On the Canadian side the beaches have been less carefully studied, and therefore a recent paper by Prof. A. P. Coleman (Bull. Geol. Soc. Amer., Vol. 15, 1904, pp. 347–368), in which the Canadian beaches are carefully mapped, and described in some detail is a distinct contribution to the literature of the large glacial predecessor of Ontario.

The beach is readily traced from near Hamilton, northeastwardly to the Trent River, but is not found beyond Havelock on the north side of the Trent. In its eastern extension beyond Colborne the beach splits into several branches at different levels. The fact that the beach ends in this way, both on the Canadian and the New York side, is a confirmation of the theory long ago advanced that the beaches were formed in an ice-dammed lake, and that the shore-line records on the northeast end disappeared with the melting away of the ice-dam against which they were made.

In Canada, Coleman finds the beach no longer horizontal, which is in harmony with the conditions in New York. The direction of greatest inclination is N. 20° E., and the amount of land-tilting which the inclination of the beaches suggests is 2 feet per mile from Hamilton to York, near Toronto; from York the quays, where the beach splits, 3.4 feet per mile; and from that point to the terminus of the beach 4.17 feet per mile. Coleman believes that 7,000 years is too short a time for the events since Lake Iroquois began, and that even 35,000 years are scarcely enough. The evidence upon which he bases this belief does not seem conclusive.

R. S. T.

AFRICA.

The Stanley Falls—Great Lakes Railroad.—*Le Mouvement Géographique* (Nov. 27, 1904) says that this railroad, which is to be 75 miles long between Stanley-

ville and Ponthierville around the rapids which interrupt navigation in this part of the Upper Congo, is now completed for 22 miles, and it is expected that trains will be running over the entire road by the beginning of next year. The entire force of 4,000 workmen was obtained from the upper river, and under the superintendence of 70 whites they have learned rapidly to construct the roadbed and perform all other kinds of manual labour required in railroad-building. Temporary bridges of wood, to be replaced later by steel bridges, are being thrown over the streams. The ties for the roadbed will be entirely of wood supplied by the forests through which the route passes. Heretofore, on tropical Africa railroads, steel ties have been used, and the present experiment will be watched with interest. When the road is completed there will be uninterrupted steam transportation from the mouth of the Congo over 1,600 miles up the river.

New Port on the Red Sea.—Mr. Corbett, the Financial Adviser to the Egyptian Government, reports that the railroad between the Nile at its confluence with the Atbara River and the Red Sea has been energetically pushed during the past year, and will, it is hoped, be completed early in 1906. The road will be designated as "The Nile–Red Sea Railway." The maritime terminus of the road will be at Sheikh el Barghout, a place some 30 miles to the north of Suakin. The official name of the new port will be Bandar Sudan. The port has the immense advantage over Suakin of possessing a commodious harbour, easily accessible to ships of heavy draught.—(Board of Trade *Journal*, Jan. 12, and Feb. 2, 1905.)

Rubber-Planting on the Congo.—According to *Le Mouvement Géographique* (No. 2, 1905), the Congo State is doing everything in its power to increase the rubber crop in that region. About 10,000,000 rubber vines have been planted since the Government began the regulation of the rubber industry. About half of these planted vines are cultivated by the personnel of the Free State and half by the Societies engaged in collecting rubber. The number of plants set out in 1904 is estimated at about 3,350,000. The Government requires that a certain amount of rubber-planting shall be done for every ton of rubber collected, and at the same time the law forbids the killing of vines to obtain the sap, and requires that the vine be merely tapped, so that the wound heals and the plant is still productive. Rubber from the districts of the Kasai and the Equateur commands the best price in the markets.

Trade in the British East Africa Protectorate.—The railroad between Mombasa and the Victoria Nyanza continues to stimulate the foreign trade of this Protectorate, in which commerce, only a few years ago, was inconsiderable. The report on the Protectorate for the year ending March 31, 1904 (*Africa*, No. 15, 1904), shows a total import trade of $3,021,835, of which about two-thirds were traders' goods or commodities imported for purchase by the natives. Cotton and, to a much less extent, woollen goods, provisions, rice, flour, and building materials are the largest articles in this trade. The exports amounted to $799,075, of which ivory and hides and horns supplied about two-thirds, grain, rubber and copra being also important.

The statistics show some falling off in trade as compared with the previous year, and this is due to the diminution of the ivory exports by about $40,000. For some years laws have been in force restricting the slaughter of elephants. The first effect was to put into circulation the hoards of buried ivory among the natives. Now that these supplies are practically exhausted, the existing laws, while preventing the destruction of elephants, hamper the ivory trade.

ASIA.

EXPLORATION OF WESTERN TIBET.—The London *Times* announces the arrival at Simla of the small party under Captain Rawling after its exploratory work in western Tibet (BULLETIN, Feb., 1905, p. 103). The sparse population gave the expedition a very friendly reception. Most of the inhabitants had never seen Europeans before and showed the greatest interest in the dress and appearance of the travellers. The Miriam La or Pass, the water-parting between the Sanpo (Brahmaputra) and the Sutlej, the large tributary of the Indus, was crossed at the end of November. It is 16,600 feet above the sea-level; but though snow was falling, the pass was easily surmounted. The Great Mansarowar Lake was carefully explored for the purpose of clearing up long-standing controversies regarding it. There was no flow at the outlet, and a rise of 3 feet would have been necessary for the stream to run. The Tibetans said that during the rains and when the snow melts (about 4 months in summer) there is an outflow. A hot-water spring was discovered a mile down the channel in the direction of the next lake, Rakas Tal, which was frozen over and had no outflow, though the natives say a stream ran from it in past years. The net result of the exploration is to place the source of the Sutlej much farther to the west than has been supposed. The British frontier was reached on Christmas Eve after crossing the Ayi-La, 18,400 feet high, amid falling snow. The Sutlej there flows through very broken country, and some of the ravines are 2,000 feet deep.

BAILEY WILLIS'S EXPLORATIONS IN EASTERN CHINA.—Mr. Willis, who received the grant for geological exploration in eastern China from the Carnegie Institution, has a report in Year Book No. 3 (1904) covering his work. He returned to the United States last summer. Some of his discoveries in eastern China were of remarkable interest. The glacial deposit of Cambrian Age, for example, is an almost unique discovery, equalled in interest in its way only by the extraordinary evidences of glaciation in southern Africa in Carboniferous times.

On the Yangtse River, in lat. 31°, as far south as New Orleans and not high above sea-level, the explorer discovered a large body of glacial till. It is unstratified, a mass of indurated clay and heterogeneous boulders, many of which show glacial polish and striæ. Prof. Chamberlin and other expert glacialists, to whom specimens have been submitted, pronounced them unquestionably of glacial origin. This deposit lies near the base of the Paleozoic system, beneath limestone which, in its lowest layers, contains pebbles from the till. The body of till is 170 feet thick. It demonstrates the existence of glacial conditions in a very low latitude in the early Paleozoic. Mr. Willis says:

> A similar occurrence at a closely-related Cambrian epoch has been reported from Scandinavia, but nowhere else has like evidence been found. This discovery takes a place among the unique facts of geological history, and the latitude, the conditions of occurrence and the conclusiveness of the evidence being considered, it will have great weight in reference to theories of climatic change.

Another far-reaching result in its effect upon broad geological theories is a contribution to the knowledge of mountains. Mr. Willis has extended the evidence that in the northern hemisphere the features of the earth's surface express recent activity of vigorous internal energy:

> In America, during the last fifteen years, through the study of topographic forms, it has been shown that the mountains of this continent are relatively recent features as compared with the rocks composing them, and owe their elevation to forces acting during the latest geologic periods down to the present. It was a point of prime interest in the comparative geology of continents whether the American methods of study applied to Asia would show that mountain growth had recently been active there also.
>
> The observations of this expedition demonstrate clearly that the histories of mountains in North

America and China run closely parallel in time, in manner of development, and in resulting features of relief. The studies of Prof. Davis in western Asia point in the same direction, and the investigations of Profs. Penck and De Martonne in the Alps and Carpathians extend the generalization to central Europe. The conclusion that mountains are recent growths—indeed, are in some districts now actually growing—is far-reaching in effect on theories of the earth's internal energy and its manifestations.

Cadastral Survey of Siam.—The *Report* on the work of the Royal Survey Department of Siam for 1901–2 has been received. The most important work in progress is the Cadastral Survey of the cultivated alluvial land in the valley of the Menam River. The field party in that season numbered 154 men, of whom six were European officers. Their surveys reached the satisfactory total of 512 square miles. Much attention is being given to the training of Siamese in the various phases of the work, and, with some supervision their service is adequate. The main object of the Cadastral Survey is to afford the Government a perfectly reliable means of assessing the land-tax due by the owners or holders of the land, who are required to contribute to the revenue of the country. The survey is also of much importance to landholders, as they learn the exact areas of their holdings, and derive improved security from the issue of title-deeds based on the Survey. Three charts show the progress of the work.

Map of India and Adjacent Countries.—The Trigonometrical Branch of the Survey of India sends a pamphlet (Professional Paper No. 1, Second Edition) concerning the map which is now being prepared on a scale of 1:1,000,000. The scale is in accordance with the recommendation of the International Geographical Congress, at its meetings in London, Berlin, and the United States. The projection adopted is a modified secant, conical projection, somewhat similar to that employed by Euler, in 1777, for his map of Russia. This projection was chosen because, as the area to be included embraces 36° of latitude and 80° of longitude, some form of conical projection was clearly indicated, and also because it was essential that all the sheets, 136 in number, should fit together to form one map. A certain amount of error will be unavoidable, but all the latitudinal distances will be correct, and the errors in longitude will not be of much importance. The map will fit into the scheme of making a map of the world on the uniform scale of 1:1,000,000. The scale is, of course, smaller than that employed in the actual field surveys. The completed map will show India a little west of the centre of the map, with Persia and eastern Arabia forming its western limits and the shores of eastern China at the eastern border of the map. Bokhara, Kashgar, and Peking will be on the northern edge, and the Horn of Africa and northern Sumatra on the southern border.

EUROPE.

Italy's Density of Population.—Vol. 5 of the Italian Census taken on February 10, 1901, has a map in colours, showing the density of population in each of the political subdivisions of the kingdom. The most thinly-populated districts, among the Italian Alps and in the Grosseto and Matera Districts of the Peninsula, have less than forty inhabitants to the square kilometer. The mean density of population of the Kingdom is 113.28 to the square kilometer. The greatest density is in Naples and its environs, where there are 3,310 inhabitants to the square kilometer.

Italian Emigration.—The *Report* of the Italian Commission of Emigration for 1904 says that in two years the emigrants have numbered 527,000. More than half of them go to the United States; and the *Report* contains many communications from Italian consuls here for the guidance of the Emigration Office, which desires to

extend such aid and protection as is possible to these numerous outgoers. It is said, however, that this work of social charity is imposing a burden upon the country which is not easily borne in its present economic condition.

STROMBOLI.—In an article illustrated by eleven excellent, full-page half-tones, Dr. Tempest Anderson describes (Geographical Journal, Vol. XXV, 1905, pp. 123–138) recent changes in the crater of Stromboli, observed as a result of two expeditions to the island—one in 1888, the other in 1904. This crater, commonly called "the lighthouse of the Mediterranean" because of the frequency with which it is lighted by the volcanic fires, lies just to one side of the centre of the island of Stromboli, the northernmost of the Lipari Islands, just north of Sicily. The entire island is volcanic, and rises from the deep sea to a height of a little over 3,000 feet above sea-level. Including the submarine portion, it is a large and lofty volcanic cone. There is evidence of earlier, probably prehistoric, eruptions of great violence and magnitude; but the eruptions of the historic period have all been moderate, though there is considerable variation from time to time. The ordinary eruptions, which occur every few minutes, are so moderate that the process of eruption may be safely photographed from near at hand, as the author did, obtaining three pictures of different stages of the same eruption. Most of the eruptions bring forth ash, but during some lava pours forth and flows down the side. Occasionally eruptions are so severe as to affect the entire island; and the author gives a list of these, recorded since 1879.

The crater lies on the slope of the island, just northwest of the highest point, and about 600 feet below it. Below the crater is a steep slope, the Sciara, which descends from the crater to the sea, having an angle of about 35°, or the angle of repose of the volcanic ash which is erupted. With each eruption ash falls upon the slope, and some of it rolls into the sea; but, although the volcano has been in almost constant eruption during the historic period, the supply of ash has not been sufficient to build this slope up regularly, as in other volcanoes. The chief contribution of Dr. Anderson's paper is the description, with excellent illustrations, of changes which have occurred in the form and position of the crater between 1888 and 1904. Altogether, considering the length of time and frequency of eruptions, the amount of this change is exceedingly slight. R. S. T.

COAL RESOURCES OF THE UNITED KINGDOM.—The Royal Commission appointed in 1901 to inquire into the coal resources of the United Kingdom has issued its final report, which, on the whole, is of a reassuring character. Adopting 4,000 feet as the limit of practicable depth in working and one foot as the minimum workable thickness, the Commissioners estimate the available quantity of coal in the proved coal fields of the United Kingdom to be 100,914,668,167 tons, as compared with 90,207,285,398 tons estimated by the Coal Commission of 1871, notwithstanding the fact that 5,694,928,507 tons have been raised in the meantime. The excess is accounted for by the more accurate knowledge of the coal seams. It is also estimated that there are 39,483,000 tons of coal in the concealed and unproved coal fields. It is thought that in future thin seams will be worked more extensively than at present, and that the use of coal-cutting machines will facilitate this work. The coal consumption in the United Kingdom for 1903 was 167,000,000 tons.—(*Nature*, Feb. 2, 1905.)

THE RAINIEST DISTRICT IN EUROPE.—Dr. Kassner, of the Prussian Meteorological Institute, discusses "Das regenreichste Gebiet Europas" in *Petermanns Mitteilungen* for December, 1904. This district, to which attention was first directed

by Hann (*Meteorologische Zeitschrift*), 1890, 143; 1894, 189), on the Bocche di Cattaro, on the eastern shore of the Adriatic, rises abruptly several hundreds, and in places thousands, of meters above the sea. The region is that of the Karst. The rainfall data for twelve stations cover ten years (1891–1900), and for three stations cover at least five years. The short periods have been reduced to the longer period in the usual way. A chart showing the rainfall of the district indicates an increase inland and towards the north, until a mean annual rainfall of 177 inches is reached, which is found nowhere else in Europe. The district of this exceptionally heavy precipitation extends east and west; is about six miles long by three wide; increases in elevation from east to west, from 700 to 1,300 meters, while isolated summits rise some hundreds of meters above the general level. The station with the maximum of rainfall is Crkvice, situated at an altitude of 1,097 meters above sea-level, with a mean annual precipitation of 179.30 inches and a maximum annual precipitation of 234.72 inches in 1896. The rainiest season is the winter, *i.e.*, it accords with the general conditions of the Mediterranean climates. During the summer, in consequence of the general pressure distribution, the prevailing winds are northerly to easterly, *i.e.*, continental and dry. In winter the prevailing winds are southerly and moist. The seasonal distribution of rainfall at Crkvice is as follows: winter, 36%; spring, 26%; summer, 7%; autumn, 31%. It is interesting to note that at Cetinje, where the mean annual rainfall is over 100 inches, the summer is so dry that drinking-water is distributed by the pitcherful from a spring kept under the control of the authorities, while water used for other purposes is brought from a spring outside the town. The variations in the rainfall from month to month and from year to year are very large. At Crkvice, in 1896–97, the months of October, November, December and January each had over 40 inches of rainfall, giving a total in these four months of not less than 179.84 inches. The precipitation is chiefly in the form of rain, and is frequently associated with thunderstorms. Snow is heavy in winter, and in some years stations at considerable altitudes are often isolated for days together.

R. DeC. W.

Sweden's Foreign Commerce in 1903.—The official statement of Sweden's foreign trade in 1903 says that the imports were $145,702,800; exports, $122,713,800. The leading imports in order of importance were raw minerals, cereals, and flour, manufactured cottons, woollens and silks, yarns and meat products; timber formed more than one-third of the exports, other leading sales including lumber, fish, and other animal products and raw metals. The countries with which Sweden has long held the largest commercial relations are Great Britain and Ireland, Germany, and Denmark, three-fourths of the commercial movement of 1903 being with these countries.

Exploring the Vatna Jökull.—The Scottish Geographical Society sent L. S. Muir and J. H. Wigner to Iceland last summer, and a brief account of their work has been published (*Scott. Geog. Mag.*, Nov. 1904). They crossed the great snow field of the Vatna Jökull, using *skier* to a considerable extent, especially in the soft snow. Hauling sledges loaded with tent and provisions, they started into the snow field at its northeast corner, and their progress, though never rapid, was fairly steady between August 13 and 25, when they reached solid ground on the southern edge near a fine glacier lake. Still keeping to the ice, however, they pushed farther west and were detained by bad weather for nearly a week in a large cave found in an old crater. A few miles farther west brought them off the ice on September 3. The total distance was about 80 miles in a straight line and as many more in side excursions. Four

virgin peaks were climbed, including Hàgöngur, the second highest measured peak. The area of the Jökull must be at least 4,000 square miles, or about one-tenth that of Iceland. The southern edge has this summer been carefully surveyed by a Danish staff, but the remainder, particularly the northeast, is still practically untouched.

The explorers say that the standard map by Dr. Thoroddsen, which is a splendid piece of work as regards the rest of the country, is very inaccurate in all relating to the Vatna Jökull. The Bruar Jökull, for example, extends for at least 20 miles farther north than is shown; the lake Graenalón is not entirely surrounded by ice, but touches dry land on two sides; the mountain Björn is not a slender ridge but a huge mass with a front to the Jökull of several miles; a number of peaks are incorrectly placed, and some just as important are not marked at all.

Rumania's Black Sea Port.—The port of Constantza, which the Rumanian Government, at large expense, adapted for the use of steamships several years ago, is growing rapidly in commercial importance. With its present steamship connections it provides the shortest route from central Europe to Constantinople, Asia Minor, and India. Ample harbour works and warehouses have been supplied, and the exports of grain and other commodities are constantly increasing. The exports in 1903 amounted to 401,095 tons, chiefly grain and flour, which are sent to Egypt, Spain, Italy, France, the Netherlands, Germany, and England. The imports were 56,262 tons, or nearly double the quantity of the previous year.—(*Export*, No. 5, 1905).

New Publication of the French Alpine Club.—The Club Alpin Français has replaced *l'Annuaire* and *le Bulletin* with a monthly, the January number appearing on the 15th of that month. The name of this attractive magazine is "*La Montagne*, Revue Mensuelle du Club Alpin Français." The publications which it supersedes have been issued for many years. The Club, through its new monthly, hopes to widen its influence, which has so long been exerted in behalf of the exploration and enjoyment of mountains. Every thing relating to mountains, and particularly to the higher mountains, will come within its scope. The first number is finely illustrated from photographs.

OCEANOGRAPHY.

Oceanic Researches.—At a meeting of the Challenger Society on January 25, the chairman, Sir John Murray, spoke on "The Relation of Oceanography to other Sciences" (*Athenæum*, Feb. 4, 1905). He pointed out that recent expeditions had made only inconsiderable alterations in the contour lines of the sea-bottom, published in the Challenger *Reports*, and was of the opinion that no great changes were likely to be made by the soundings of future expeditions. He believed that the great ocean basins had been practically unaltered through geological time, but that the continents (including a zone not more than 200 miles seaward of their present outline) had frequently altered their levels. He supported this belief by the fact that all known sedimentary rocks are of terrigenous character, to the exclusion of deep-sea material. The meteorology of mid-ocean, where the diurnal temperature range of the water is about 2° F., was contrasted with the meteorology of land-masses, where absorption and radiation are high and the diurnal atmospheric range may amount to 80° F. As an example of the far-reaching effects of the temperature, the speaker cited the range of animal variation where hot and cold currents are at war, amounting, in some cases, to over 40° F.; in such regions the animal death-rate is very high, and the dead organisms decomposing on the bottom start the formation of glauconite, a well-known constituent of sedimentary rocks. As another result of temperature, it

has been estimated that a tropical copepod lives twenty-four times as fast as an Arctic copepod in the same period of time. This may explain the predominance of specimens and paucity of species in the Arctic as compared with the tropical fauna.

PILOT CHARTS OF THE SOUTH ATLANTIC AND SOUTH PACIFIC OCEANS.—The U. S. Hydrographic Office intends to publish pilot charts of the South Atlantic and South Pacific Oceans, similar in scope to the present monthly pilot charts of the northern parts of these oceans. The charts will be published quarterly, instead of monthly, the first to appear being those for the South Atlantic. Successive seasonal charts of the South Atlantic will appear quarterly until the entire year has been included, after which a like series will be published for the South Pacific. The Hydrographic Office requests the co-operation of mariners in the preparation of these charts.

INVESTIGATIONS IN THE EASTERN PACIFIC.—Extracts from a letter by Mr. Alexander Agassiz to Fish Commissioner Bowers, dated Lima, Nov. 28, 1904, are printed in *Science* (Feb. 3, 1905). Mr. Agassiz joined the *Albatross* on Nov. 1 at Panama. She was under command of Lieut.-Commander L. M. Garrett, and Mr. Agassiz speaks in the highest terms of his efforts and those of the officers, crew, and scientific staff in the interests of the expedition.

The *Albatross* started at once towards Chatham Island in the Galápagos group, making a straight line of soundings from Mariato Point, the southwest corner of the peninsula on the west side of the Gulf of Panama. The deepest sounding (1,900 fathoms) was about 100 miles southwest of Mariato Point. The bottom then continued to show about 1,700 fathoms for nearly 200 miles, and then shoaled very gradually to 1,418 fathoms, about 80 miles from Chatham Island. The 1,000-fathom line was about 60 miles from Chatham Island. A short line was run south of Hood Island, revealing a somewhat steeper slope to that southern face of the Galápagos, over 1,700 fathoms being reached in less than 50 miles. The bottom then remained comparatively flat, attaining a depth of 2,000 fathoms about 100 miles farther south. This depth was carried eastward on a line from south of the Galápagos group to Aguja Point, near the northern end of Peru. The following results on this cruise from south of the Galápagos to Callao were obtained:

About half way to Aguja Point soundings increased to over 2,000 fathoms; remained at that depth to within 60 miles of the coast, when depth rapidly shoaled; soundings from Aguja Point southwest to 675 miles west of Callao showed depth increasing from 2,200 fathoms, 100 miles off the Point, to nearly 2,500 fathoms; running east to Callao, depth increased to about 2,600 fathoms; 80 miles off Callao over 3,200 fathoms found in the Milne-Edwards Deep; in two days spent in developing this Deep, soundings of 1,490, 2,845, 458, 1,949, 2,338, and 3,120 were found, showing great irregularity of the bottom in an area less than 60 miles in diameter.

Trawling, in charge of Mr. F. M. Chamberlain, began off Chatham Island, and was carried on at 20 stations. The pelagic collections were remarkably rich, and were especially noteworthy for the great variety and number of pelagic fish obtained inside the 300 fathom-line, from 300 to 650 miles offshore. Many of these fishes had been considered as true deep-sea fishes, to be obtained only when dredging between 1,000 and 1,500 fathoms or more. At one time the tow-net brought up from 300 fathoms, the depth being 1,752 fathoms, no less than 12 species of fish with nearly 150 specimens. Among the most interesting types found in less than 300 fathoms were *Stylophthalmus* and *Disomma*, both of which Chun considers as deep-sea fishes; also a species of *Eurypharynx*, obtained for the first time in the Pacific.

In the lines that were run across the great northerly current which sweeps along the coasts of Peru and Chile and is deflected westward at the easterly corner of the Galápagos Islands an unusually rich pelagic fauna was obtained at depths less than 300 fathoms. The finer tow-nets yielded immense collections of radiolarians, diatoms, and *Dinoflagellata*, many of which have been considered to live at great depth and upon the bottom. The number of diatoms found in these tropical regions is most interesting. They have been thought to be characteristic of more temperate and colder regions. The surface waters in places were greatly discoloured by their presence and bottom samples at depths of 1,490 to 2,845 fathoms formed a true infusorial earth, showing the influence of diatoms in the track of the great Peruvian current.

There was great variety in the hauls on successive days, showing how hopeless it is at sea to make any quantitative analysis of pelagic fauna and flora at any one station, within the influence of such a great oceanic current as the Chile and Peruvian stream.

Down to a depth of 2,200 fathoms or so the bottom was composed of *globigerina* ooze, its character being more or less hidden when near the coast by detrital matter which is drifted out to sea.

North of the Galápagos vegetable matter was found at nearly all the stations; and between the Galápagos and Callao such material was not uncommon in the trawl.

Six stations were occupied for the taking of serial temperatures, two at the western ends of the lines perpendicular to the coast across the Peruvian current, two in the centre of the current, and two at a moderate distance from the coast. These serials developed an unusually rapid fall between the surface and 50 fathoms, the temperature dropping from 71.7° to 59.2°; at 200 fathoms it was 51°; at 600 fathoms 40.7°, the bottom temperature at 2,005 fathoms being 36.4°. The temperature of the station in the central part of the current in 2,235 fathoms agreed with the western series. At the eastern part of the line in 2,222 fathoms with a bottom temperature of 36.4°, the surface being only 67°, there was a close agreement at 50 and 100 fathoms, the lower depths at 400 and 600 fathoms being from 1° to 2° warmer than the outer temperatures. A serial from the surface to 100 fathoms showed that the greatest drop in the temperature took place between 5 and 30 fathoms. The bottom temperature in nearly all the depths sounded was 36°, a high temperature for the depths attained.

Mr. Agassiz says that the changes made in the working apparatus of the *Albatross* have proved most satisfactory, From Callao the expedition was to proceed to Easter Island.

GENERAL.

Sale of Arctic Exploring Vessels.—The two Antarctic ships, *Terra Nova* and *Morning*, which relieved the National British Antarctic expedition on the *Discovery*, were sold at Portsmouth, England, on January 11. Mr. William Ziegler, of New York, bought the *Terra Nova* for $48,000, and she will be used by the relief expedition which will start next spring for Franz Josef Land to meet the Fiala party. The *Morning* was sold for $8,000. *Nature*, which gives this information, also says that the *Discovery* has been sold privately to the Hudson Bay Co. for $50,000.

Antarctic Meteorological Stations.—Permanent stations for carrying on meteorological observations in the far south are increasing rapidly in number, thanks to the admirable co-operation between the Argentine Meteorological Office, under its efficient and progressive Director, Mr. Walter C. Davis, and recent Antarctic expeditions notably the Scottish National Antarctic Expedition. The Argentine

Government has resolved to continue the station at Scotia Bay, South Orkneys, for a third year, and a new party, consisting of five men, has recently been sent there. A new house is to be built for the magnetic instruments. During the past summer (1904–05) the Argentine Government proposed to install a complete set of meteorological and magnetic instruments at the Penguin Islands. New Year's Island has also been equipped by Argentina. Cape Pembroke, on the Falkland Islands, has recently been equipped and inspected by Mr. W. S. Bruce, in co-operation with the British Meteorological Office. M. Charcot, of *Le Français*, is at present carrying on observations on the west side of Graham Land. Captain Larsen left Buenos Aires in November for South Georgia, where a permanent whaling station is to be established. This station is to be supplied with a complete set of meteorological instruments by Mr. Walter G. Davis. The next few years will doubtless witness a very rapid development of our knowledge of Antarctic meteorology.

R. DeC. W.

MEAN TEMPERATURES OF HIGH SOUTHERN LATITUDES.—Dr. Hann has recently contributed to *Nature* (Jan. 5, 1905) the results of a calculation made by him of the mean temperatures of the higher southern latitudes, using data obtained by the recent Antarctic expeditions. The preliminary table is as follows:

South latitude	50°	60°	70°	80°
Yearly temperature	41.9°	28.4°	11.3°	−3.6°
January "	46.9°	37.8°	30.6°	20.3°
July "	37.2°	18.2°	−8.0°	−24.7°

Mean temperature of both hemispheres:

	JANUARY.	JULY.	YEAR.	ANNUAL VARIATION.
Southern hemisphere	63.1°	50.5°	56.5°	12.6°
Northern "	46.4°	72.5°	59.4°	26.1°
Whole earth	54.7°	61.5°	57.9°	6.8°

The mean temperature of the southern hemisphere was previously determined (by Perrel and Hann) to be 59°, from data up to 55° S. The recent observations in higher latitudes show that the southern hemisphere is about 3° colder than the northern. (The above data were originally in Centigrade degrees. They have been converted into Fahrenheit degrees, and given to the nearest tenth by the compiler of this note.)

R. DeC. W.

GEOLOGICAL BIBLIOGRAPHY FOR 1903—*Bulletin* No. 240 of the U. S. Geological Survey is devoted to the Annual Bibliography and Index of North American Geology, Paleontology, and Mineralogy for 1903. This useful work is compiled by Mr. F. B. Weeks, Librarian of the Survey. Heretofore these bibliographies have been prepared solely from publications received by the library of the Survey, but the present issue records and indexes many geological papers that under the earlier practice were not noticed in the bibliography.

GLACIAL ORIGIN OF CIRQUES.—Two papers read before the International Congress of Arts and Sciences at St. Louis, and recently published in the *Journal of Geology* (Vol. XII, 2d, 569–588), deal with the question of the glacial origin of Cirques in high mountains, with especial reference to the Sierra Nevada. One of the papers is by Willard D. Johnson, who tells how, as a topographer called upon to map a portion of the high Sierras, he was impressed with the marked difference in topography there as compared with that of mountains in unglaciated regions. He

found the upper valleys broadly open, with steep sides, so characteristic of cirques, and the grades of the valley bottom in steps, some of which had a backward or up-stream slope.

The evidence suggested a process of basal sapping associated with former glaciation, but it seemed difficult to understand how a glacier resting against a rock slope, and drawing away from it, could undercut and cause the cliff to recede. Noticing the long crevasse which ran parallel to the amphitheatre wall a little way out on the ice—the *Bergschrund* of the Swiss mountaineer—it occurred to him that if this ran to the base of the ice it might offer an explanation of the puzzling phenomenon of cirque formation. Accordingly, he had himself lowered to the bottom of the Bergschrund, a depth of 150 feet, the last 20 or 30 feet of which had one wall of rock. Here was a chance for sharp frostwork, frequently repeated, with possibly daily alternations from freezing to thawing conditions, which would result in much "plucking," a veritable quarrying and excavation, by which the cirque head would be moved backward.

Since its first statement, in 1883, a large number of glacialists have applied Johnson's hypothesis in the field, and some have found it exceedingly useful in accounting for the topography of cirque regions, among these Dr. G. K. Gilbert, whose paper in the same number of the *Journal of Geology* applies the hypothesis to certain regions in the high Sierras. Gilbert finds numerous facts to substantiate the hypothesis, including the fact that the cirques in the region studied are steeper on the north side where running east and west, and on the east side where running north and south, these being the sides where the Bergschrund would be best developed, owing to the greater accumulation of snow in these protected situations. His paper is accompanied by a number of excellent pictures illustrating cirque conditions as applied to this hypothesis.

Gilbert, as well as others, is inclined to assign to glaciers an enormous power in cirque formation, cutting the great, deep amphitheatres and pushing the divides back. To others the vast amount of work postulated by the hypothesis seems incredible and to be accepted only when no other hypothesis can be considered possible. One result of such work of glacial excavation would be to supply an enormous quantity of rock fragments, both large and small, and cirque excavation on the scale proposed should be accompanied by great moraine accumulation ; but, so far as the reviewer is aware, such correlated deposits have not been observed. It is true that glacier streams remove a large proportion of the drift supplied by the melting ice ; but even mountain torrents would not remove the large fragments resulting from plucking, and these fragments should be especially abundant if, as Johnson says, "the line of most rapid advance in the glacier mass is from near the bed, at the rear, to the surface, near the front."

R. S. T.

Effect of Debris in the Advance of Glaciers.—The reasons why the fronts of some glaciers are now retreating, others advancing, and why the rates of advance and retreat of glaciers vary, even in a single area, are now engaging the attention of numerous students of glaciers and glacial action. Doubtless the reasons for these variations are numerous and their interaction complex. One cause for difference in rate of ice advance or retreat, not ordinarily considered, is discussed in a recent paper by I. H. Ogilvie (The Effect of Superglacial Debris on the Advance and Retreat of Some Canadian Glaciers, *Journ. Geol.*, Vol. XII, 1904, pp. 722–743). His point is that under conditions otherwise identical glaciers thickly covered with rock debris, and thus in a measure protected from melting, will show a less measure of retreat than glaciers with less debris. Applying this to specific cases, he concludes that debris

covering is responsible for the advance, and, in fact, for the continued existence of the glaciers of the eastern Rockies.

In his description of individual glaciers, Ogilvie calls attention to the peculiar form of the front of the Victoria glacier, which does not face directly down the valley but diagonally across it, the ice-front facing northwest. This he interprets as the result of the direction at which the summer sun strikes the glacier, so that the form of its front is determined by the position of maximum melting, not by the direction of motion.

R. S. T.

New Physiographic Terms.—With the development of the scientific description and interpretation of land-forms authors have deemed it necessary to introduce a large number of new terms, most of which have died at birth, while some, being much needed and admirably adapted to the needs, have survived, and found permanent adoption into the geographic nomenclature. Prof. Salisbury (*Journ. Geol.*, Vol. XII, 1904, pp. 707–713) has found the need of three new physiographic terms: (1) topographic unconformity; (2) topographic adjustment, and (3) superimposed youth.

By "topographic unconformity" is meant "greater topographic age on the upper part of a slope and lesser topographic age on the lower part of the same slope, with a distinct line or belt of separation between the two." The less common case of younger topography above, and older topography below, would also be topographic unconformity. Streams that have adjusted their courses to the weaker strata Salisbury proposes to call in "structural adjustment;" streams whose profile is adjusted to existing conditions he would call in "topographic adjustment;" and streams not so adjusted he would call in "topographic non-adjustment." His third name, "superimposed youth," is applied to those conditions where an older topography has for some reason had its drainage features so changed that a system of young stream valleys is developed over, or superimposed on, the older topography. For example, the drift-sheet left by the continental glacier over a mature topography has, over wide areas, caused the development of younger streams in the drift, and even in the under rock, forming gorges, waterfalls, swampy tracks, and lakes in regions whose rock topography is distinctly too mature for such valley conditions. Salisbury suggests that if other causes for such superimposition should make it necessary, this condition resulting from glaciation might be called "glacially superimposed youth."

These new terms undoubtedly indicate a need which other physiographers besides Prof. Salisbury have felt. It is a pity, however, that less-cumbersome terms could not have been found to meet this need, for it is probable that many workers will prefer the circumlocution necessary, without definite names in the employment of such terms as "topographic non-adjustment" or "glacially superimposed youth.' It is, at best, difficult to secure the adoption of new terms, even when needed; and it is true that the ones which have been most thoroughly and acceptably adopted are those that are terse as well as descriptive. "Glacially superimposed youth" does not possess the merit of *peneplain*, *monadnock*, *grade*, or even of *river pirate*.

R. S. T.

The Cyclonic Element in Climatological Summaries.—The usual climatological summaries, which give the averages of the different elements by the year, or month, or day, do not emphasize the importance of the cyclonic and anti-cyclonic controls of our weather. The cyclonic and anti-cyclonic units are irregular in time and duration of occurrence; therefore, they are lost sight of in averages for definite periods. It is obvious that, in order to obtain a rational and vivid picture of the actual climatic conditions of places in the latitudes of the stormy westerly winds, we should, in some way, make the cyclonic and anticyclonic units a basis of averages.

A suggestion to this effect was contained in a paper read by Prof. R. DeC. Ward at the Eighth International Geographic Congress in Washington last September (*Suggestions Concerning a More Rational Treatment of Climatology*). Proceeding along very much the same lines, Dr. W. N. Shaw, F.R.S., presented a paper on *The Treatment of Climatological Observations*, before the Scottish Meteorological Society, in Edinburgh, December 6, 1904. The importance of the subject is so great that a summary of Dr. Shaw's paper may well be given here.

The practice of summarising observations in the form of weekly and monthly means and extremes is convenient, and the results for some purposes valuable; but since the actual weather of the British Isles does not arrange itself in such regular periods, a system of classification which deals with consecutive weekly or monthly divisions as homogeneous leaves something to be desired for certain problems. The distribution of barometric pressure from day to day may be adopted as a basis of classification, and the object of the inquiry, towards which Dr. Shaw's paper is a contribution, was threefold:

First, to combine the climatological data in such a way as to exhibit effectively the modifying influence of geographical position upon the general weather conditions of the locality. Second, to mark out in clear outline and give numerical expression to the specific characteristics of weather associated with distributions of pressure which may be regarded as typical. Third, to secure the co-operation of the observers at the normal climatological stations in filling the outline by putting together the data for their stations, as they are obtained, upon some plan organized by mutual agreement.

Six different types of pressure distribution may be distinguished in the British Isles:

I. S. E. Type.—A pressure distribution favourable for S. E. winds, or, according to the amount of incurvature, for E. winds.

II. S. W. Type.—For winds from S. W., or from some point nearer S.

III. N. W. Type.— " " " N. W., " " " " " W.

IV. N. E. Type.— " " " N. E., " " " " " N.

V. Variable Cyclonic Type, with the sequence of winds incidental to the passage of a cyclonic depression.

VI. Variable Anticyclonic Type, with the uncertain winds of the interior of an anticyclonic region.

This is, of course, not an exhaustive classification; indeed, each of the first four types may be conveniently subdivided into three, according as any station is in a position where the isobars are concave towards the low-pressure area, nearly straight, or concave towards the barometric maximum. So far the inquiry has extended to groups of stations in the districts named, and for the periods indicated in the following table, which gives the number of days in the different periods that might be referred to the several types:

TYPE.	ENGLAND N. W. 1896–1898. JANY.	JULY.	MIDLAND COUNTIES. 1897–1899. JANY.	JULY.	SCOTLAND E. 1897–1899. JANY.
I. S. E.	13	2	11	7	11
II. S. W.	40	35	32	19	43
III. N. W.	18	28	12	27	18
IV. N. E.	13	6	14	13	5
V. Variable Cyclonic	7	8	5	6	5
VI. Variable Anticyclonic	2	14	19	21	11

The data for the first two districts were for periods with only two years in common; but the January data for Scotland E., and for the Midland Counties of England, for one and the same period, showed a relative preponderance of the S. W. and N.W. types in the more northern district, and represented definitely a difference of climatic conditions for the two districts. The weather of each station in each group has been analyzed as regards rainfall, temperature, etc., and the results gave a definite measure of the peculiarities of any place or district for any type of weather. Altogether the method of distributing the observations according to weather types brought out a number of striking points which would be masked or obliterated if only weekly or monthly averages were used. The student of meteorology is able to get a much clearer and more definite insight into the facts of meteorology by bringing to the numerical test a number of statements which have long been recognised in a more vague and general form.

Such work is necessarily laborious, but may be lightened by the co-operation of observers in the various districts. R. DeC. W.

A Chinese Map of the World.—Dr. Ahlenius publishes a description of a map of the world that has been discovered in the University library at Upsala, Sweden. It was compiled by the Belgian Jesuit Ferdinand Verbiest, and bears his Chinese name, Nan-Hoei-Gin, and that of the Emperor, Kang-Hsi (1661–1722), by whom he was appointed Director of the Astronomical Academy in Peking. Verbiest had exceptional opportunities for acquiring information about the Chinese Empire, as he accompanied the Emperor on his journeys into Manchuria and Mongolia. His map is drawn on the stereographic projection, the degrees on the Equator being marked eastwards only, and not east and west from the first meridian through Peking. The material seems to be taken from Mercator, Ortelius, Thévenot, Sanson, Blaeu, and other cartographers. China, Manchuria, Mongolia, and Central Asia are laid down from Verbiest's own observations and investigations. The Amur River flows into the Fretum Anian, the mythical strait between Asia and America. Strange to say, New Zealand is represented as an island, though it was proved to be so only in 1769 by Cook. The nomenclature was apparently first put in a Latin form and then transliterated into Chinese (*Geog. Jour.*, Vol, XXIII, No. 6, p. 791).

POLAR REGIONS.

Peary's Coming Expedition.—Commander Peary is now very busy with preparations for his return to North Greenland, to resume his efforts to explore the Arctic Ocean north of America and to reach the North Pole. His vessel, which is under construction at Bucksport, Me., embodies the best ideas yet evolved as to model, strength, and general fitness for polar navigation. She will be completed about May 1, and will come to New York to take on supplies, which will be in sufficient quantity for three years.

Peary will start for Greenland early in July, and expects to reach Cape Sabine in about a month. He intends to utilize the Arctic Highlanders more than has ever been done before, and will have a large number of dogs, upon which he will depend to haul his sledges over the frozen ocean. On his way up the Smith Sound and other channels he will probably plant supply depots at Cape Frazer, Cape Lawrence, and Lady Franklin Bay (Fort Conger). He hopes to start on his sledge journey over the sea-ice in February next, and to reach the pole and be back at his land-base some time in June, 1906.

Relief for the Fiala Expedition.—Mr. Champ, the secretary of Mr. Ziegler, whose North Polar Expedition, under the command of Mr. Anthony Fiala, has not

been communicated with since it entered the ice of Barents Sea nearly two years ago, has returned from Europe after completing arrangements for the relief expedition. Mr. Champ purchased the Dundee sealer *Terra Nova*, which took part in the British expedition that brought Captain Scott's party home from the Antarctic regions. He also chartered the *Belgica*, well known for her work in the Antarctic.

The *Terra Nova* will sail from Norway about the second week in May, and simultaneously the *Belgica* will sail from Iceland. Both vessels will be bound for Franz Josef Land, which was to be the base of Fiala's operations. By choosing two routes of approach to that archipelago it is hoped that one of the vessels at least may get through, last year's relief party having been unable to make way through the pack-ice of Barents Sea.

PERSONAL.

Prof. Raphael Pumpelly was elected President of the Geological Society of America at its recent meeting in Philadelphia.

Sir John Murray has received the Count Lütke medal of the Russian Geographical Society; and has also been elected Honorary Member of the Geneva Geographical Society in place of the late Sir Henry M. Stanley.

Dr. George P. Merrill was elected President of the Geological Society of Washington and Waldemar Lindgren and A. H. Brooks Vice-Presidents, at the twelfth annual meeting of the Society.

Mr. A. Silva White, formerly Secretary of the Royal Scottish Geographical Society, has been appointed Assistant Secretary of the British Association.

Prof. Dr. Josef Partsch, of Breslau, will succeed the late Friedrich Ratzel as Professor of Geography at the University of Leipzig, beginning his duties in the summer semester of this year.

OBITUARY.

Dr. Alpheus S. Packard, Professor of Zoölogy and Geology at Brown University, died on February 14 at the age of sixty-six years. His writings were very numerous, especially in the field of entomology. Among his works of special interest to geographers were "The Mammoth Cave and its Inhabitants," "Observations on the Glacial Phenomena of Labrador and Maine," "A Naturalist on the Labrador Coast," and many geological papers.

NEW MAPS.

AMERICA.

United States.—Geologic Atlas of the United States. No. 114. De Smet Folio. South Dakota, 1904.

In the central part of the State, on the east slope of James River Valley, extending between Latitudes 44° and 44° 30′ N. and Longitudes 97° 30′ and 98° W. Area about 857 square miles. Its features are chiefly those of subdued glacial topography, the basins being shallow and widely separated, the swells very low, and most of the surface covered with glacial deposits. The quadrangle contains no valuable mineral or coal deposits, no streams furnish water the year round, and the artesian supplies are apparently declining.

No. 116. Asheville Folio. North Carolina–Tennessee. 1904.

It extends between Longitudes 82° 30′ and 83° and Latitudes 35° 30′ and 36°, containing 968.70 square miles. The quadrangle is nearly all included in the mountain division of the Appalachian province. A bit of the northwest corner is in the Great Valley, and consists of low, rounded hills and shallow valleys; but nearly the whole quadrangle is occupied by mountain chains with broad plateaux and deep, narrow valleys. The drainage is mainly into the French Broad and Pigeon Rivers. Among the useful rocks are granite for building, abundant material for constructing roads, marble, and limestone suitable for making lime. The resources in water-power are very great.

UNITED STATES.—Alaska: Juneau Special Map. Topographic Sheet. Scale, 1:62,500, or 0.9 miles to an inch. Geological Survey, Washington, D. C., 1904.

This is interesting as one of the first detailed topographic sheets of any part of Alaska. These surveys are now being carried out at a number of the most important mining centres. As Juneau is one of the best-known mining regions, this map, giving its topography by contours, will be of special interest to many persons. The results of the Canadian Survey on the north and east are included on the sheet. They are not so detailed as those of our own Survey, as the contour interval in the Canadian area is 500 feet, but only 100 feet in the Alaskan area.

NEW YORK.—Map of the Hudson Valley between Hoosic River and Kinderhook Creek. Scale, 1:127,000, or 2 statute miles to an inch. Contour interval, 40 feet. By T. Nelson Dale. U. S. Geological Survey, Washington, 1904.

Illustrates *Bulletin* No. 242. "Geology of the Hudson Valley between the Hoosic and the Kinderhook." Five symbols to show geological formations. Fossil localities and chief outcrops indicated.

KANSAS.—Geologic Map of the Iola Quadrangle, Kansas. Showing location of oil and gas wells in September, 1903. Scale, 1:125,000, or 1.9 statute miles to an inch. Contour interval, 20 feet. U. S. Geological Survey, Washington, 1904.

Illustrates *Bulletin* No. 238. "Economic Geology of the Iola Quadrangle, Kansas." Fifteen symbols for rock formations; locations of oil wells, gas wells, and dry holes shown. The quadrangle is in the prairie region, and the rock formations are interstratified shales, sandstones, and limestones. There were 725 producing oil wells at the end of June, 1903. The gas-producing territory extends about nine miles east and west and 4 miles north and south in the Iola-Laharpe region, and has supplied much more gas than any other field in the State. Attracted by this cheap fuel, zinc-smelting companies erected large smelters in the Kansas gas fields, and more than one-half of the spelter produced in the United States is smelted by Kansas gas, much of it by smelters within the Iola Quadrangle.

PORTO RICO.—The Luquillo Forest Reserve. Scale, 1:190,080, or 3 statute miles to an inch. U. S. Department of Agriculture, Washington, 1905.

This forest reserve was set apart by Presidential proclamation on Jan. 17, 1903. The reserve is in the east part of Porto Rico, and covers a large portion of the Sierra de Luquillo, a mountain mass separated from the mountains of the rest of the island by the valley of the Rio Grande de Loiza, the largest river in Porto Rico. The reserve contains much land under cultivation, chiefly coffee farms. Less than 30 per cent. is Government land. The Federal forest land, 20,000 acres, is in almost a solid block. The purpose is to make good roads and to develop and conserve the timber resources, the idea being that the sales of charcoal, timber, and gum may ultimately make the reserve self-supporting.

West Indies.—Carte Sismique de la Méditerranée Antillienne. Scale, 1:5,600,000, or 88.3 statute miles to an inch. Government of Mexico, City of Mexico, 1904.

The map appears in Vol. XIX, Nos. 11–12 of *Memorias y Revista* of the Scientific Society "Antonio Alzate." It illustrates a paper in French by Mr. F. de Montessus Ballore on the seismic-geological relations observed among the West Indian Islands. Isobaths show the depths of the surrounding waters, coast-lines on which seismic waves have been recorded are distinguished from other coasts, and the number of earthquake shocks on record at each centre of seismic disturbance is shown.

Bolivia.—Plano de la Ciudad de La Paz. Scale, 1:4,000, or .056 statute mile to an inch. Levantado por la Comision Topográfica, La Paz, 1902.

The scale is sufficiently large to show the outlines of the buildings. The positions of 55 of the public buildings, schools, hospitals, theatre, churches, etc., are noted.

EUROPE.

Austria-Hungary.—Eisenbahn- u. Postkarte von Oesterreich-Ungarn. Scale, 1:1,500,000, or 23.67 statute miles to an inch. Artaria & Co., Vienna, 1905. (Price, K. 2.20.)

The fifth edition of this standard railroad and postal guide of Austria-Hungary. It shows all railroads, steam or electric, wagon roads in the postal service, railroad stations, the distance between junction stations, and gives much other information required by travellers. Insets on larger scales show northwestern Bohemia, where railroad stations are closer together than in most other parts of the empire, and maps of Vienna, Prague, and Budapest, showing railroad depots and the suburban service. An index of 30 pp. makes it easy to find all railroad stations on the map.

Belgium.—Carte des chemins de fer, routes et voies navigables de la Belgique. Scale, 1:320,000, or 5 statute miles to an inch. Publiée par l'Institut Cartographique Militaire. Brussels, 1904.

Shows the political subdivisions by colours, railroads, canals, navigable and unnavigable streams, etc., up to date. The map is also ruled into squares indicating the limit of the sheets on the large scale, 1:20,000, Government map. This sheet is convenient to handle, and gives a large amount of information.

Cyprus.—A Geological Map of Cyprus. Scale, 1:348,480, or 5.5 statute miles to an inch. Compiled by C. V. Bellamy. (With 16 pp. key.) Edward Stanford, London, 1905. (Price, 6s.)

Though intended primarily to illustrate the geology of Cyprus, it is also a superior map for general purposes. The nomenclature is full but not crowded, as the scale permits the use of many names. Carriage roads, bridle paths, monasteries, and ruins appear, and Christian villages are distinguished from Moslem villages. Many elevations are given in English feet.

Five colours show the distribution of geological formations. The oldest strata are the Trypanian* limestones, assigned to the Cretaceous Age, and the foundation on which the later rocks were laid down. These limestones apparently were a part of a land surface during most of the Eocene Period; then came the subsidence of this land, and it was covered by the sandstone shales that are referred to the latest part of the Eocene.

Above this second or Kythraean (named from Kythræa) series are the Oligocene

* Local definition, derived from Trypa Vouno, a summit of the Kyrenia Range.

marls, containing gypsum and alabaster, proving that the subsidence continued until the water was of great depth and deposits similar to modern oceanic oozes were formed.

An epoch of volcanic disturbance, accompanied by general upheaval, brought the subsidence to an end. The Pliocene strata of Cyprus rest unconformably upon the older rocks, and belong to the younger members of that series, so that here is indicated a second break in the geological history of the island. During this interval, and at a time corresponding with the early Pliocene stage, the igneous rocks appear to have emerged and the mountain ranges came into existence. Only their summits showed above the surface ; they were groups of islands, now the Troados Mountains on the south and the Kyrenia Hills on the north. Beneath the waters of the Pliocene Sea surrounding these islands the sandstones, conglomerates, and associated strata, all fruitful in fossil remains, were being deposited. Finally the receding waters revealed the island and introduced the Pleistocene Period. Later came high elevation and torrential floods, which were responsible for much of the land sculpture, and changed the physical aspect of the country into the condition in which it is now found.

IRELAND.—Bartholomew's "Quarter Inch to Mile" Map of Ireland. Scale, 1:253,440, or 4 statute miles to an inch. Roads revised by the Cyclists' Touring Club. The Edinburgh Geographical Institute, 1904. (Price, paper, 1s.; cloth, 2s. per sheet.)

The seven sheets of this map are among the latest products of Bartholomew's map house, and they will please all who appreciate good taste, clearness, and accuracy. They make a fine map of Ireland for any purpose, though specially intended for tourists. Roads are distinguished as main roads, secondary roads, and footpaths. The driving and cycling roads are shown in brown, and the land is coloured according to contours of elevation. Roads that are not coloured are not recommended to cyclists. Inns, hotels, fishing-streams, lakes, woods, forests, antiquities, etc., are also indicated.

SWEDEN.—Karta öfver Sveriges Jernvägar och med Statsbidrag byggde Landsvägar och Hamnar (Sheets 1 and 2). Scale, 1:1,000,000, or 15.7 statute miles to an inch. Contributions to Swedish Official Statistics, No. 32. Stockholm, 1904.

A map of the transportation routes of Sweden. It shows all the land and water-routes, including roads; marks the anchorages and the head of navigation on rivers, and indicates routes in operation, those that are being constructed, and projected lines. An inset on the larger scale of 1:700,000, or 11 statute miles to an inch, gives somewhat more detailed information of the extreme southern part of the country south of Engelholm. Sheet 2 shows the route of the Luleå-Ofoten-Fiord railroad, most of it north of the Arctic Circle, on a larger scale than in previous maps. It is to be regretted that in so finely-executed a map no topographic feature excepting hydrography is shown.

AFRICA.

SOUTH AFRICA.—Geological Survey of a portion of the Pretoria and Middelburg Districts. Scale, 1:148,920, or 2.3 statute miles to an inch. Geological Survey of the Transvaal. *Report* for 1903, Pretoria, 1904.

The *Report* which this map accompanies deals with the first year's work in the field by the Geological Survey as reorganized by the British. It was decided first to examine and map some line of country that would traverse a number of the more important formations and groups of rocks, so that the geological information obtained

would be as varied as possible. The total area mapped during the season amounted to 1,138 square miles. This map of the larger part of the district surveyed shows geological formations in thirteen colours, together with the direction of dip of strata, boundaries of formations, fault-lines, glacial striæ, anticlinal axes, mines, etc.

SOUTH AFRICA.—Railway Map of South Africa. Scale, 1:3,864,960, or 61 statute miles to an inch. Published by authority by *South Africa*, London, 1905.

The latest railroad map of South Africa, showing railroads in operation, in construction or authorized, proposed railroads, coach-routes in connection with train service, carrier-routes in Rhodesia, and telegraph lines. All railroad stations are indicated, and there are eight insets of the leading ports, others of suburban lines at Cape Town, Pietermaritzburg, and Durban, and an inset of Africa showing the Cape to Cairo route. This route, however, north of Broken Hill, in Northeastern Rhodesia, is likely to be modified.

SOUTH AFRICA.—TRANSVAAL. Standard Map of the Witwatersrand Gold Fields. Scale, 1:40,000, or .6 statute mile to an inch. (3 sheets.) By Frank Flowers, C.E. George Philip & Son, Ltd., London, 1904. (Price, paper, £3, 3s.; cloth, in case, £4, 4s.)

Shows the reef outcrops, geological faults, gold properties, names of estate owners, water-rights, bore-holes, and gives other information concerning the part of Witwatersrand within range of the mining operations. Insets show parts of the mining districts on an enlarged scale, and also a plan of the mining and magisterial districts, given in detail on the three sheets. The map is well engraved, and is important for all who are practically interested in the mining region around Johannesburg.

ASIA.

RUSSIAN CENTRAL ASIA.—Übersichtskarte des Zentralen Tian-Schan zur Veranschaulichung der Reiserouten der Merzbacherschen Expedition in den Jahren 1902 u. 1903. Scale, 1:1,000,000, or 15.7 statute miles to an inch. Petermanns Mitteilungen, Ergänzungsheft, No. 149, Justus Perthes, Gotha, 1904.

The map shows the Tian Shan Ranges, between Longitudes 76° and 83° E. It is based upon the Russian 40-verst map, and gives the route surveys and other observations made by Dr. Gottfried Merzbacher's expedition. After seeing the Tian Shan mapped only on small atlas sheets, this comparatively large-scale map of the central part of the chain gives a vivid impression of the vast area covered by these snow-topped mountains, and of the enormous spread of glaciers on all sides of the high mountains and along the flanks of the chain. The map, however, is intended chiefly for the readers of Dr. Merzbacher's preliminary report, and another delineation of the mountains will take its place as soon as the explorer's surveys, determinations of heights, and geographical positions have been worked out, so that a definitive map may be made. With the map are two remarkable photographic panoramas obtained during the journey.

AUSTRALIA.

AUSTRALIA.—Geological Sketch Map of the Country in the Vicinity of Sydney. Scale, 2¼ statute miles to an inch. Prepared under the direction of E. F. Pittman, Government Geologist. Department of Mines and Agriculture, Sydney, 1904.

Illustrates a paper on some of the dykes and volcanic necks of the Sydney district appearing in *Records* of the Geological Survey of New South Wales, Vol. II., Part 4. Geological formations, and positions of dykes and other volcanic phenomena are shown in colours.

BOOK NOTICES.

The Guide to South Africa.—Twelfth edition. lxiv and 477 pp., 14 maps, 2 diagrams, and index. Union-Castle Mail Steamship Co., London, and 8 and 10 Bridge Street, New York, 1904. (Price, 2s. 6d.)

This book is full of information for tourists, sportsmen, invalids, and settlers. It is evident that care has been taken to make the compilation accurate. Sportsmen may find, for example, all details concerning hunting equipment, varieties of game, the game laws, and the regions where game may still be found. Farmers may learn of the distribution of agriculture, the nature of soils, the crops, forests, live stock, facilities for irrigation, and regulations for the sale of lands. All points of interest to tourists, routes of travel, hotel accommodations, and other information receive full attention. The maps and town plans, prepared by George Philip & Son, London, are very satisfactory specimens of cartography. Some of the routes described extend into the British Central Africa Protectorate.

Life in Canada. By Thomas Conant. vi and 290 pp. and 27 illustrations. William Briggs, Toronto, 1903. (Price, $1.50.)

The author makes some interesting contributions to the history of Canada, chiefly Ontario, and to our knowledge of the manners and customs of its inhabitants in the century beginning in 1792, when his ancestors settled in the country. His book throws light on the pioneer days of nineteenth century development; and this record of the early struggles, the hardships, the perils, the sturdy courage, and virtues of our friends across the Border will interest us almost as much as the similar experiences of our forefathers.

In those early days the settler in Ontario often saw the work of the industrious beaver. The value of all other furs was made by comparison with a beaver skin. Salt-water salmon at that time swarmed in Canadian rivers. In November they ascended the streams for spawning, and they were often caught in Lake Ontario. Of course, they were not found above Niagara Falls. Wolves were a terrible pest, and the Government paid a bounty of about $6 for each wolf's head. Thomas Conant, the author's grandfather, in 1806, spent an evening at the home of a young woman with whom he was "keeping company," and about midnight set out for his home, three miles away. A pack of wolves in full cry were soon upon him, and he saved his life only by climbing a beech tree, where he spent the rest of the night with the animals howling around him. Slavery existed in upper Canada till 1793, when it was abolished. There were not many slaves, but no compensation was paid to their owners. In his travels the author thinks he has seen no country that so much resembles Ontario as the plains of Hungary, near Budapest. It was difficult for the early settlers of Ontario to pay for their farms, because there was little market for their produce; money was extremely difficult to get, and even if there had been markets a farm was unproductive until cleared of timber, so it was harder to pay $4 an acre then than $80 to-day. The book is well illustrated.

Südamerika und die deutschen Interessen. Von Dr. Wilhelm Sievers. 95 pp. Strecker & Schröder, Stuttgart, 1903. (Price, m. 2.70.)

This monograph is an authoritative summary of South America in its racial, political, and economic aspects. Dr. Sievers says that South America, since the

middle of the last century, has lagged behind the other continents in geographical research and the study of its resources and commercial possibilities, because Africa, after 1850 and especially after 1880, nearly monopolized the interest of the European Powers, six of which divided practically the whole continent among themselves. When there was nothing left in Africa to distribute, the chief interest of Europe turned to Asia, where Russia had been extending her domain since the middle of the 19th century; while Great Britain, France, and Germany, and also the United States, have acquired new fields within a few years.

The first chapter treats of the political development of South America, its population, including the German, Italian, Negro and Chinese elements, as well as the Spanish, Portuguese, and native Indian, and the influence each has exerted. The author then describes the material progress, great mining development having preceded agriculture on a large scale. The largest tropical agricultural products are coffee, cacao, and sugar, cotton and tobacco playing a subordinate rôle. In subtropical South America (Argentina, Uruguay, and central Chile), the progress of agriculture in recent years has been remarkable. Peruvian bark and coca have a place between agriculture and forest products, among which rubber and Paraguay tea (Mate) are most important, while the timber and other forest products are as yet comparatively little utilized. The manufacturing industries and commercial conditions are discussed in all their leading features. Sixty-one pages are given to these various phases of the continent, and the next 28 pp. to the relations of Germany with each of the states. Dr. Sievers says that, without doubt, the soil of South America is more productive than that of Africa, Australia, or even Asia. It has no great areas of uncultivable lands, such as the wastes of Africa, Australia, and Asia; its mineral wealth is unsurpassed; its tropical forests are unequalled, and no other continent has so large a mileage of navigable rivers. The writer regards the advent of large commercial and industrial interests from Europe as promising a new era in development; and he believes it to be within the power of Germany to take a very prominent part in the progress of the continent.

Beschreibung Ägyptens im Mittelalter, aus den geographischen Werken der Araber. Zusammengestellt von Else Reitemeyer. 238 pp. No index. Dr. Sevele & Co., Leipzig, 1903.

An uncommon and noteworthy book. Its contents were selected from the works of Arab geographers who wrote between 891 and 1526 A.D. A chapter on the Nile, for example, is made up of the compiler's translation of extracts from the writings of a number of these chroniclers, the name and period of each writer being given. They tell of the sources of the Nile, its floods and low water, irrigation canals and other features. The flora and fauna of Egypt, its ancient history, its cities, soils, and products, are among the topics treated in the other chapters.

Some of the most interesting pages describe ancient monuments that have since been destroyed or mutilated by time or vandalism. The book is, on this account, of much archæological interest. The compiler remarks in the preface that when the reader finds in this volume errors and fantastic explanations mingled with many statements that were true, he should not forget that we cannot measure these writers by standards we apply to writings of the present day; and that the value of these Arab descriptions is increased by the fact that they connect Egypt in the earlier part of the Christian era with Egypt of modern times, and give much information of value about a period of which we know very little from other sources.

Japan in the Beginning of the 20th Century. viii and 827 pp. No index. Imperial Japanese Commission to the Louisiana Purchase Exposition, Tokyo, 1904.

An official and exhaustive work, compiled in the various departments of the Japanese Government for foreign readers, and of value to all who wish to acquaint themselves with the material condition of Japan. It deals with geography, population, government, and land system of the empire; with the primary industries of agriculture and stock-raising, mining and the fisheries; with the manufacturing industries, their encouragement and protection, and industrial education; with the foreign trade, finances, currency, and banking; with communications by post, telegraph, and telephone; and with transportation and education. A supplement of 50 pp. gives similar information concerning Formosa.

The section on the geography of Japan is little more than a bare summary of the orographic and hydrographic features, their position, and extent, and of the leading towns and ports of the country. Heights are given in terms of the Japanese *shaku*, which, however, is so nearly equivalent to 1 foot (.994) that heights expressed in this denomination may be used by readers of English without much difficulty. The geology of the empire is treated in a chapter on minerals, but is chiefly confined to the economic aspects of the subject.

Europe and the Far East. By Sir Robert K. Douglas. viii and 450 pp., 2 black and 2 coloured maps and index. The University Press, Cambridge, 1904. (Price, 7s. 6d.)

This volume is one of the Cambridge Historical Series, the aim of which is "to sketch the history of modern Europe with that of its chief colonies and conquests, from about the end of the fifteenth century down to the present time." Prof. Douglas's contribution deals with the relations between the European nations and the countries of China, Japan, Annam, and Siam. In a book of medium size like this it is, of course, necessary to treat in a summary manner a great deal of the information given on so large a topic, but Prof. Douglas's style is animated and his narrative is interesting. He treats each of these eastern countries separately in their relations with Europe, and gives considerable attention to their physical features, natural resources, and means of communication, all of which have their influence upon the political, philanthropic, and other relations between Europe and the East which he unfolds. He appends a long bibliography for those who desire to extend their studies, and has this to say about the use of the hyphen in Chinese names:

> The use of the hyphen in Chinese words is often misleading. It used to be the habit to separate each syllable of a Chinese name by a hyphen, which is no more necessary than it would be to write Win-chester or Peters-burg. This usage is gradually becoming obsolete. We now write Peking instead of Pe-king, Shanghai instead of Shang-hai; and the old practice, where unnecessary, will, no doubt, die out in time.

A short article on Chinese geographical terms gives the meaning of a considerable number of syllables or words that are much used in Chinese place-names. The book will be very helpful to those who seek to interpret recent events in the light of the causes which led up to them.

A Russo-Chinese Empire. (An English Version of "Un Empire Russo-Chinois." By Alexandre Ular. xix and 301 pp. and index. Archibald Constable & Co., Ltd., Westminster, 1904. (Price, 7s. 6d.)

This political essay is based upon the history of events in East Asia within the past 40 years, and especially upon the Russian advance on China, by which, accord-

ing to the author, the Russian Government was able practically to annex Manchuria and Mongolia, and entertained the ultimate purpose of incorporating at least the north of China in the Russian Empire. He writes of the Chinese with sympathetic appreciation of their virtues, defends them against those who say they have a low standard of civilization, and takes a wholly anti-Russian view in his account of the expansion of Russia in the Far East. He undoubtedly presents many facts that have escaped general notice in the Occident.

Dans les Rapides du Fleuve Bleu. Par le Lt. de Vaisseau Hourst, iii and 363 pp., 50 illustrations and a map of Szechuan. Plon-Nourrit & Co., Paris, 1904. (Price, 10 fr.)

Lieut. Hourst, the first man to descend the Niger from Timbuktu to the ocean, successfully made the ascent of the Yangtse rapids in October, 1901, on the French gunboat *Olry*, which, although not very well adapted for her dangerous journey, got through the gorges above Ichang and steamed farther up the river than the British vessels which had preceded her. The Germans attempted to make the same journey in 1900, but their steamer, the *Sui-hsiang*, was wrecked on a reef, and Capt. Breitag was drowned.

The book is a popular and vivacious description of Lieut. Hourst's triumph over these dangerous rapids. It is well illustrated, and abounds with entertaining incidents and anecdotes. It is to the author's credit that he succeeded in making a triangulation of the river through the rapids between Ichang and Chungking, 395 nautical miles, and between Chungking and Suifu, 230 nautical miles. This survey will be of value for the navigation and more accurate mapping of the river.

Een Jaar Aan Boord H. M. Siboga. Door Mevrouw A. Weber-van Bosse. (Second Edition.) xi and 335 pp., numerous half-tone pictures and a map. No index. E. J. Brill, Leiden, 1904. (Price, fl. 1.50.)

For readers of Dutch this is a delightful book. It is a description of a year's cruise on the deep-sea exploring vessel *Siboga* in the Indian Archipelago in 1899 and 1900. It was a voyage covering 12,000 sea miles, and was very fruitful in biological collections, and additions to our knowledge of a wide area of the sea-floor. The leader was Prof. Max Weber of Amsterdam, who was accompanied by Madam Weber-van Bosse, herself an accomplished naturalist, who made a very complete collection of algæ during the cruise. The routine of scientific work on an exploring vessel is revealed, the methods and apparatus for making collections are described, and there are stories of visits to the islands and many amusing incidents that give variety to a cruise. The book is popular, and while the average reader cannot help imbibing considerable oceanography and biology, he is spared a large amount of scientific detail.

The New Nation. By Percy F. Rowland. x and 324 pp., 2 Appendices and index. Smith, Elder & Co., London, 1903. (Price, 7s. 6d.)

This is a sketch of the social, political, and economic condition and prospects of the Australian Commonwealth. The author spent seven years in various parts of Australia, and he has endeavoured to write a candid and impartial account of the young Commonwealth. His view of Australia, from her beginnings in the Convict Settlement to her present position as a great State among the nations, is full of enlighten-

ment and not without humour. He treats all phases of the elements and influences which gradually evolved the present Australia, sketches the political and social life on the ranges and in the mines and towns, and pictures the artisan, the state of culture and the position of education, art, the drama and literature. He studies the national characteristics, and presents a very clear and interesting view of the economic conditions and outlook. Mr. Rowland thinks the knighthoods and other honors conferred by the Colonial Office should be discontinued:

> Awarded as they are at present to all and sundry that happen to stand most in the public eye or secure the most effective political patronage, their effect on the sentiment of some of the more thoughtful of Australians towards England is little less than disastrous. The term C.M.G., for example, suggests to most loyal subjects in New South Wales nothing in the world so vividly as "Corner of Market and George Street"—the site of the public-house kept by a recipient of imperial honour some years since (p. 296).

The appendices contain a Report on the excessive hours of labour in Sydney shops and a Plea for English Literature in the primary schools.

Une Croisière au Spitsberg, Par Jules Leclercq. 111 and 282 pp., 30 photographic reproductions and a map. Plon-Nourrit & Co., Paris, 1904.

The story of the voyage of a tourist party on a comfortable yacht to Spitsbergen. This journey was once regarded as hazardous, and no women would tempt its perils. To-day, however, the voyage is looked upon as a simple affair. On this occasion eight women were among the forty-five passengers, who also included a number of scientific men bound for a summer vacation in the Arctic. The book is a very entertaining account of the voyage, which included not only the long coasts of southern and western Spitsbergen, but also the fiords and towns of northern Norway and a side trip to the coast of Lapland.

Stops were made at numerous points in Spitsbergen, and the author tells interesting and sometimes tragical stories associated with the history of a number of places. The modest cabin in which Andrée lived for the last four months of his life was still standing. It seemed to be awaiting his return, for everything about the place was in good order. The map shows the triangulation of the Russian and Swedish missions in their survey of an arc of the meridian, and the results of the work of other recent investigators.

Elemente der Terrainlehre des Kartenlesens und Croquierens. 41 pp. and table of cartographic symbols. F. West. Brody, Austria, 1904. (Price, 80 heller—about 40c.)

This little book is intended primarily for military surveying during a campaign, but it will be of value to advanced students of geography for its clear, comprehensive and systematic definition of the German words relating to orographic, hydrographic, and topographic forms and aspects, its helpful section on map-reading, and its directions for cartographic work in the field. The book is elementary, but is full of hints and information of use to readers of German who wish to familiarize themselves with map-reading and the elements of map-making.

Geschichte der Erdkunde. 1. Teil. Von Dr. Siegmund Günther. xi and 343 pp. and index of names. Franz Deuticke, Leipzig and Vienna, 1904. (Price, $2.90.)

Dr. Günther tells in this learned and exhaustive book of the ideas of the ancients concerning geography, and traces at length and with many references to authorities

the great isolated journeys, the eras of discovery, and the scientific progress of the study up to recent times. He indicates the scientific value of the work done in each period. This will be a most convenient and useful reference book, in which the work of each century and of all important explorers and scholars, in its main features and scientific outcome, may very conveniently be studied.

Lehrbuch der Geographie, von Herman Wagner. Siebente Auflage, Erster Band. Einleitung, Allgemeine Erdkunde. Mit 85 Figuren. Hannover und Leipzig, Hahn'sche Buchhandlung, 1903.

This volume of about 900 pages is a revised reprint of the sixth edition, which had been exhausted so quickly that no actually new edition could be prepared. In this case the demand for the book is a proof of its merits. It represents, indeed, the most complete compendium of the whole field of general geography, presented in an admirably brief and concise form. The introduction contains a bibliography of the geographic literature of the world (periodicals, reports, and proceedings of societies, cyclopedias, textbooks, maps and atlases, geographic names, publications of Government surveys, and on the teaching of geography); (2) a history of the science and its methodology from the earliest times to the present, and (3) a discussion of the concept and of the divisions of geography (36 pp.). The results of the latter appear in the arrangement of the geographical matter proper, which is treated in four "books": I, Mathematical geography (200 pp.) ; II, Physical geography (530 pp.) ; III, Biological geography (90 pp.), and IV, Anthropogeography (190 pp.). The arrangement of the subdivisions of these books is of especial interest as presenting another attempt at an exhaustive classification of our science, to which so much attention is paid at present in this country.

In Book I the first chapter deals with *orientation*, thus making the problem of location the starting-point of geography—viz., orientation (*a*) on the horizon, (*b*) in the sky, (*c*) on the earth's surface, (*d*) results of the preceding three—geographical location—including not only latitude and longitude, but also methods of surveying, triangulation, etc.

The second chapter deals with the *globe:* (*a*) shape and size, (*b*) physical properties (density, heat, magnetism, etc.).

Chapter three discusses the *motions of the earth:* (*a*) Rotation, (*b*) revolution summing up the results in (*c*) the solar system, and (*d*) effects of gravitation.

Chapter four is given over to the *geographic map*, treating (*a*) projections, (*b*) means of cartographic expression (contours, hachures, etc.), and (*c*) map-reading.

Book II is divided into four chapters : The surface of the earth, the land, the ocean, the air.

The chapter on the *surface of the earth* includes the general distribution of land and water, the continental slopes, coast-lines, etc.

The chapter on the *land* deals with (*a*) all the composition of the earth's crust, (*b*) crust movements, (*c*) external changes of the crust (especially erosion and deposition), (*d*) results of these changes, (*e*) surface-forms (mountains, valleys, plains, etc.), (*f*) lakes and rivers, (*g*) coasts and islands.

The chapter on the *ocean* has only three subdivisions : (*a*) Ocean spaces (level, size, depth, etc.), (*b*) sea-water, (*c*) movements of the ocean.

The chapter on the *air* treats : (*a*) temperature, (*b*) air-pressure and winds, (*c*) vapour and precipitation, (*d*) climate.

Book III discusses (*a*) the biosphere, (*b*) distribution of organic life, (*c*) general

results of migration and adaptation, (*d*) the vegetation of the land, (*e*) useful plants and animals.

BOOK IV treats : (*a*) the human race, (*b*) natural divisions of the human race, (*c*) cultural divisions of the human race, (*d*) States (political geography), (*e*) religions, (*f*) settlements and density of population, (*g*) ways and means of transportation, (*h*) commerce and traffic of the world.

The different sizes of the four books are striking illustrations of the inequalities of the development of scientific geography along the different lines of work. While the danger of identifying it with physical geography is less menacing in Germany than in this country, the book on physical geography is nevertheless the largest of all, and the most specified, proving that even in the Old World this is the field of geography which has been longest under the influence of scientific methods, and therefore is as yet richest in definite scientific results. Mathematical geography includes a great many topics which are not represented in American textbooks, but which are recognized throughout the country as part of the science and which will become parts of our college courses as soon as they are better developed. The subject-matter of this book has been well defined, anyway, for many years, and contributions to it, as far as the purely geographical matter is concerned, will hardly be made any more. It is not so with the contents of Books III and IV. Covering new, or very young, fields of geographic research, the material for them is as yet limited, and positive results are few—so few that in our textbooks the whole matter generally figures as an appendix to physical geographies. As a question of principle, it ought to be noted that the author has made each of these young branches, biogeography and anthropogeography, the subject of a book of its own, which, while small at present, is expected to grow up to the size of physical geography in due time. The task of classifying this new material, and of attempting a reduction of the new ideas set to work on it by Ratzel and others, to a few concise chapters which will enable the reader to get in a short time a brief, but complete, knowledge of the main points of this work, has been admirably performed, as it can be done only by one himself a scholar and an investigator, who gives of his own even where his intention is mainly to report on the work done by others. As a basis from which to start the further upbuilding of anthropogeography to as complete a structure as we know now that physical geography can be made, this division of the book will be of lasting value to the development of the geography of man.

Thus, according to Wagner, scientific geography of the future will consist of four equally important and well-defined parts—mathematical, physical, biological, and anthropogeography. These, however, represent only the first half of geographic science as a whole—namely, general geography. The second half, which is expected to become another volume of some 900 pages, is "Länderkunde"—viz., regional geography. That this, too, can be made the object of scientific work is a theory admitted by only few in this country, where the geography of the countries has so far been limited almost exclusively to the elementary school courses. Not so abroad, where the "special" geography is as much an object of the scholar's work as the "general." While general geography, according to Wagner, studies the general laws of distribution of natural and human phenomena all over the earth's surface, without special regard for the localities where they are found, special geography, or Länderkunde, makes those localities the centre of observation and defines the results of the co-operation of these laws as shown in those localities; or, in other words, in general geography, the laws are the principal things and the different regions figure in the study only as far as they serve to explain the working of the laws; in special geo-

graphy the regions of the earth are the principal thing, and the laws figure only as far as they explain the character of the regions.

There is then elementary geography, both special and general, for the schools, and there is scientific geography, both general and special, for the universities.

Two features that make the book of especial value as a reference book are the excellent special bibliographies which are given at the beginning of the chapters and the exhaustive index. The appendix contains a chronological table of geographic events from the oldest times to the present, lists of the most important geographic measures and their reductions to the metric system, and a table of the measures of parallels and square degrees in different latitudes according to Bessel's earth spheroid.

M. K. G.

The Opening of Tibet, an Account of Lhasa and the Country and People of Central Tibet, etc. By Perceval Landon, Special Correspondent of the *Times*. xvi and 484 pp., 48 full-page double-tone plates and a frontispiece in colour. Doubleday, Page & Co., New York, 1905. (Price, $3.80.)

The publishers of this American edition of a book, which sells for two guineas in England, announce in a circular that they have been impressed with the observation frequently made that the prices of net books are too high, and that, though they had the author's permission to omit many pages, they have retained the full book for the low price named.

It must be said that the work is presented in a style every way creditable to the De Vinne Press and to the publishers, who, it may be hoped, will not be led to regret their experiment.

In an introductory note Col. Younghusband commends Mr. Landon as a competent chronicler of what the Tibet Mission saw and did. Mr. Landon tells, with earnestness and fluency, the story, now somewhat monotonous, of the wicked foreigner and the virtuous Briton. There was in Lhasa a bad Russian named Dorjieff, who used his influence to make the Dalai Lama more anti-English than he was by nature, and the military mission to Lhasa was the result.

The story of the march and the opposition offered by the unreasonable Tibetans may be accepted in the absence of any statement from the other side, and the reader will turn with a sense of relief to Mr. Landon's descriptions of the wonderful scenery. The colour of Tibet, he says, has no parallel in the world—neither in Egypt, nor South Africa, nor at Sydney, nor Calcutta, nor Athens; and its crowning glory is the sunset.

The panorama of Lhasa is unique:

> There is nothing missing from this splendid spectacle—architecture, forest trees, wide green places, rivers, streams, and mountains all lie before one as one looks down from the height upon Lhasa stretching out at our feet . . . . there was nothing to promise us this city of gigantic palace and golden roof, these wild stretches of woodland, these acres of close-cropped grazing land and marshy grass . . . . a man can have no eye for anything . . . . but this huge palace-temple of the Grand Lama . . . . a marvel in stone, nine hundred feet in length and towering seventy feet higher than the golden cross of St. Paul's Cathedral. The Potala would dominate London—Lhasa it simply eclipses.

Mr. Landon speaks well of the people. Their courtesy was unfailing, and they entertained the stranger with the best they had to offer.

They do good work in metals, especially in brass, and their jewellery is exquisitely finished and suggestive of Byzantine work; but their most wonderful productions are their books—more beautiful, as Mr. Landon thinks, than those of any

other country. The book cover is of close-grained wood, in three panels, each carved in minute details, cut in quarter-inch relief. The cover is heavily gilt, and lined with silk, protecting the first page of the manuscript. This page is of a rich-glazed Prussian blue, with the opening words of the book in raised gold characters in a central inset panel. The next page has a miniature on the left, and then every page to the end of the book is painted in letters of gold, or alternately in lines of gold and silver.

Mr. Landon's chapters on Religion, Manners and Customs, Art, and Lamaism were, perhaps, imposed upon him by the nature of his subject. They are interesting in themselves, but the author fully acknowleges his indebtedness to other writers and makes no claim to originality. He has used his material legitimately and without making any very serious mistake.

The heat of composition is probably responsible for the confusion of pronouns in the following passage on page 221 :

On his (the Chinese Amban's) way he met Mr. Nicholls, an American, at Ta-chien-lu, the frontie city, where he seems to have spent some time in extracting money from the Chinese prefect and the Tibetan "gyalpo" alike. He seems to have asserted his intention of restoring Chinese authority, and he admitted no sympathy with the Tibetan desire for seclusion, arguing that if Sze-chuan was open to foreigners there could be no reason why the pretensions of the Tibetans should be permitted for a moment. He moved on to Batang for the same dubious purposes that had detained him at Ta-chien-lu.

The grammatical construction of the first sentence makes Mr. Nicholls the extractor of money, but the context shows that throughout the passage *he*, *his* and *him* are meant for the Amban. Mr. Nicholls is mentioned, as it seems, only to make him report, in a foot-note, that hair and nail-parings of the Dalai Lama were sold at enormous prices in Ta-chien-lu. There is nothing strange in this ; the Chinese, like other men, have the craze for amulets and relics.

Ulrich Schmidel. Viaje al Rio de la Plata (1534–1554). Notas Bibliográficas y Biográficas por Bartolomé Mitre. Prólogo, Traducción y Anotaciones por Samuel A. Lafone Quevedo. Buenos Aires, Cabaut y Cía. Editores, Librería del Colegio—Alsina 500, 1903.

The "Junta de Historia y Numismática Americana," on the banks of the La Plata River, has put out the first volume of its "Biblioteca," a Spanish rendering of Huldrich or Ulrich Schmidl, of Straubing, published in German, as is well known, for the first time in 1567 at Frankfort-on-the-Main. The translation from the original German into Spanish is due to Don Samuel A. Lafone Quevedo, also the notes and the prologue, whereas the biographic and bibliographic annotations are from the pen of General Bartolomé Mitre. It is an octavo of 491 pages, printed by Cabaut & Co., at Buenos Aires in 1903, and adorned by a number of illustrations, the execution of which deserves much credit as reproductions of old pictures, of landscapes, actions, Indians, etc., from the Hulsius edition of 1599, including a reputed portrait of Schmidl, several facsimiles of his signature, and three maps—one from Hulsius, "Schifffahrten" (1599), the second from the Map of South America, by Delisle (1700), and the third by Father Jolis in 1789, giving the topography and ethnography of the "Gran Chaco."

It is with great pleasure that we compliment the publishers for the excellent work they have done, typographically and pictorially, making the book a pleasing addition to any library, as far as its output comes into play.

Now to the literary part, introduced to the reader by an "Advertencia," written

in better taste, that is, with less buncombe than is often the case with South American books of the kind. The bibliographic and biographic notes by Don Bartolomé Mitre follow, and there is much in them that is interesting and even of value. The minute dissertation about the name of Schmidl might have been considerably shortened, for, to any one who is thoroughly acquainted with German names, North, Central, and South, it is a familiar fact that terminations in "el" and "l" are usual in southern German simply as diminutives, and, with children, used in an endearing sense. General Mitre is no Germanist. Neither has he been successful in his parallel between Bernal Diaz del Castillo and Huldreich Schmiedel. That both were soldiers is about all they have in common, and they share this with many, many others, whether writers or not. Of this class, Spanish-American literature has a number of cases, and just us important and valuable ones as either of the two mentioned. Pedro de Cieza (even if he had written but the first and second part of his chronicles), for example, stands on a much higher level, and, as far as we know, he was a soldier, too, at least during the time he spent in South America. The works of the two mentioned are indispensable to students of Spanish-American history, and Schmiedel is more valuable to the geographer, the naturalist, and the ethnographer than Bernal Diaz, in a certain way, but there is no occasion for placing them apart from, or above, any of the other Spanish writers of note on the early times of discovery and colonization.

The Prologue by Señor Lafone Quevedo relative to the identification of geographic terms, of names and places, and especially of Indian tribes, cannot fail to be of solid value and an important contribution to knowledge. He treats in it of his own country, where he is at home, and on which he has at his command a large literary material. He is, on these matters, entitled to a very respectful hearing. But when we come to his Spanish rendering of the old German text or, probably, of any text in German, we regret to be compelled to apply the Italian proverb: *Traduttore-Traditore.* It would be unpleasant to allude in detail to the glaring proofs, furnished by his translation, of the fact that the German idiom, whether modern or ancient, is to him a book with more than seven seals. We must, however, in order to substantiate our statements allude to a few of his errors: (p. 140), *Feur gemacht* he gratuitously changes into *Feier gemacht*, rendering it by: "and there we rested." How far his ignorance of German has developed is further exemplified, in the same place, by rendering *fire* as synonymous with *azúcar*, or sugar; (p. 158, note I.), Of *Pluetig*, which he correctly translates in the text by *bloody*, he says in his note, "it might be supposed a derivation from *Blau*—blue." Since when has *blood* sprung from *blue*—a colour that has so little to do with it? The expression *blaues Blut* (blue blood), is used in a wholly exceptional sense; to apply it literally will be news to such as have acquired German elsewhere than in Buenos Aires; (p. 182, note 5), It may be asked how *zerprechen*, to break, comes to mean *zarpar*, to sail or leave (applied to a ship), whereas the context itself clearly indicates that the three ships remained there, and only the two others left. More portentous yet is the rendering of *Mit der Zeit* (in the course of time) by *mientras esto*, instead of *con el tiempo*. Still more incomprehensible is the mistake, persistently repeated, of translating *Die Frauen gehenn mit ihrer scham bedeckt* or *Beddeckt mit ihrer scham* by the absolutely contrary: *no se tapan las vergüenzas*. Enough of these lamentable errors, that show how the would-be translator had better have limited himself to annotating and left the translating part to such as know German.

Very valuable is the Appendix, through the number and importance of the documents it contains. In many respects (the translation always excepted) the book is a

great improvement on the version of Ternaux-Compans, who had not at his command the documentation of which the present volume gives such an abundance of rare—nay, of unique—material. A. F. B.

The Story of the Congo Free State: Social, Political and Economic Aspects of the Belgian System of Government in Central Africa. By Henry Wellington Wack. xv and 634 pp., 125 Photographic Reproductions, Maps, Appendix and Index. G. P. Putnam's Sons, New York and London, 1905. (Price, $3.50.)

This volume tells the history of the Congo Free State from its inception, through the periods of formation and development, down to the present time. It is a story worth recording. All students of the African movement know that no other part of barbarous Africa, not even Uganda, has made such progress as the Congo Free State. This is shown by many material facts. Even photographs give abundant evidence. The pictures in this volume of railroads, steamboats, schools, missions, hospitals, orphan asylums, farms, and trade schools where natives are learning carpentry, printing, tailoring, and other forms of skilled labour supply incontrovertible testimony to the transformation in progress.

The author is a lawyer and a student of African affairs. His legal training undoubtedly helped him to write his able analysis of the political relations of the Congo Free State from the Berlin and Brussels Conferences to the present year. He discusses the legal aspects of the founding of the State, the régime which the Berlin Act sought to introduce into the Congo Basin, the principles upon which the Congo system of internal government is based, and questions of frontier and diplomatic settlements. The attention the author has given to African matters also helps him in his treatment of the geography and tribes of the Congo, though he is not a geographer. Mistakes occur, such as the statement that the Aruwimi joins the Congo just below Nyangwe (p. 52). It was not Dr. Junker who discovered the Welle, but Dr. Schweinfurth, and it was Grenfell instead of Van Gèle (p. 53) who revealed the lower Mobangi, and ascended it 400 miles, though it was Van Gèle later who established its identity with the Welle-Makua, and proved it to be the largest Congo tributary. Such inaccuracies are not numerous, and are easily corrected.

It is not within the scope of the *Bulletin* to comment on the accusations brought against the Congo State in England. Four chapters, however, are filled with the testimony of men of world-wide reputation, who say in effect that the recitals of outrages upon the natives and of bad administration are perverted and exaggerated statements; and evidence is adduced that the progress of the State and of the natives under its rule has been remarkable, and that the State is prospering in a greater degree than any other of the African colonies.

The book is in large part the story of this progress, which is, indeed, remarkable when we remember that only twenty-five years ago the Congo region was the darkest part of Africa. At that time the Arab slave-raiders carried on their trade with brutality over the eastern third of the Congo Basin. The Congo Free State brought about the complete suppression of these devastating bands, and there is now no slave-raiding in this vast territory—a third as large as the United States. Cannibalism, human sacrifices, inter-tribal wars, and other great evils have been suppressed in large areas, and before many years will disappear entirely.

Here are some condensed facts that are given *in extenso* in this volume:

Thirteen telephone and telegraph offices are open in the State. The telegraph extends from Boma

up the Congo to Coquilhatville, nearly 750 miles. Another telegraph line 200 miles long connects Kasongo on the Lualaba with Baraka on Lake Tanganyika.

Extensive harbor works have been erected at Banana, Boma, and Matadi. The river channel in the lower Congo is being constantly improved by dredging. The present tonnage into and out of the ports of Banana and Boma is now over 500,000 a year.

A large flotilla of steamboats does excellent service on the upper Congo. The State operates thirty-two of these vessels, the commercial companies about forty-five, and private individuals and missions have smaller steam craft. The tonnage of the upper Congo steamboats is 1,675; the marine service numbers 166 whites and 1,200 blacks. The Government has a fortnightly steamboat service between Leopoldville and Stanley Falls, about 1,000 miles.

The railroad between Matadi and Stanley Pool, 270 miles long, has proved to be one of the most profitable railroads in the world. First-class passage costs $100, and second-class (for natives) $10. Freight rates are also very high. The road has a monopoly of freight carriage between the interior and the Atlantic. As the book was going to press, news was received of some reduction in these charges.

A railroad line is being constructed between Stanleyville and Ponthierville to circumvent the eighty-mile stretch of rapids on this section of the river. The line will be completed this year.

In and far around the numerous Government stations life and property are practically as secure as in any part of Europe or America. A large acreage is being turned by the plough for the growing of coffee, cacao, Assam tea, pepper, cinnamon, and other condiments.

Great expense has been incurred by the State and various companies in the purchase and importation of horses and cattle selected from the best European stocks. The enterprise has proved very successful. These breeding establishments, many of them on the upper Congo, now exceed 70, and there are now in the State 4,500 cattle of European origin, with 60 horses.

The State offers rewards to the natives for the cultivation of coffee and cacao, supplies the necessary seed, and buys all the produce. Coffee flourishes best in the districts of Equateur, Aruwimi, and Stanley Falls. In 1894 the coffee plants amounted to 61,517; in 1902 to 1,996,200.

Caoutchouc is harvested by extracting the fluid from the stem in such a way as to do no injury to the plant. It is a simple operation. The rubber annually exported is about one-sixth of the world's supply. The forests abound with rubber, and the value of the vines thus far planted by the Government and the companies is about $1,000,000.

The Government has prohibited the shooting of elephants to prevent their extinction in the Congo forests. The cutting and export of lumber is regulated by law, as it is intended to preserve the forest areas.

The State discountenances polygamy. No man with more than one wife is eligible for employment either in the military or civil service. Christian marriages between natives take place by thousands every year. Alcoholic liquors are prohibited over nearly the entire area of the State, the sale being limited to 12,500 square kilometers on the lower river.

The export of commodities produced in the State for 1903 amounted to $10,919,567, of which over four-fifths was rubber, the next largest items being ivory and palm nuts. In the same year the imports amounted to $4,179,266, of which Belgium supplied three-fourths.

There are between 200 and 300 white Protestant missionaries, besides native evangelists. The Roman Catholic missions number 384 missionaries and sisters. The missions of the Protestant sects are prosperous and are doing great good, but the solidarity of the Catholic missions has especially favoured their growth. They are maintaining over 500 schools, 113 churches and chapels, 529 farm chapels, 7 hospitals, and there are 71 Christian villages and 72,383 professing Christians enrolled.

Both Protestant and Catholic mission societies maintain many trade schools. Thousands of children are taking courses of instruction in all the common useful arts. The Government also maintains at many of its stations similar courses of manual training. Both boys and girls are quick to learn, and when they complete the course of training they readily find employment in the Government, commercial, or missionary enterprises. In 1890 the Government assumed the guardianship of orphans and forsaken children, who are now provided at various stations with the means of livelihood and a practical education. It is believed that as a result of the wise and broad policy established in the Congo State its black inhabitants will acquire the habit of regular work and attain a degree of civilization that is beyond their reach as long as they remain in a state of primitive idleness.

The map in colours deserves special mention because it is an American product of more than average merit, while exhibiting at the same time some of the defects that make the general cartographic output of our map-houses so inferior to the standard required in most European countries.

Very good material was evidently placed in the hands of the manufacturer, and his engraver made a faithful effort to produce it. Unfortunately, some of this mate-

rial was a little old; and as maps made in our country seem to lack adequate geographic supervision unless it is supplied by the persons ordering the maps, mistakes naturally occur.

The basin of the Kwilu River, north of the Congo, for example, is included within the limits of the Congo Basin, though it is tributary directly to the Atlantic. All the longitudes are given as west of Greenwich, which is regrettable, as the whole of the Congo Free State lies east of Greenwich.

The "proposed" route of the Cape to Cairo R.R. is extended as far north as Lake Tanganyika, though all who know this enterprise are aware that its route has not yet been determined beyond Broken Hill in Northeastern Rhodesia. Four thousand black labourers, under white superintendence, are building the railroad between Stanleyville (called Stanley Falls on the map) and Ponthierville. Upon the completion of this railroad at the end of the present year there will be continuous steam communication for over 1,700 miles up the river. Geographical periodicals have told of this railroad for months past, and three of them have mapped it; but there is no sign of the road on this map specially made to illustrate a book which, by the way, describes the enterprise.

The map has no indication of heights, though many elevations have been ascertained. No rapids are marked in the cataract region of the lower Congo. If figures had been given to show that the difference of elevation between the termini of the railroad around these cataracts is 1,800 feet, the map student would naturally infer that the river is not navigable in that district. Many names mentioned in the book are not given, and a considerable number of Government stations are not indicated. A little competent direction would have improved the map, which has excellent features.

The Republic of Chile. The Growth, Resources, and Industrial Conditions of a Great Nation. By Marie Robinson Wright. 450 pp. and about 275 half-tone Illustrations. George Barrie & Sons, Philadelphia, 1904. (Price, $10.)

A quarto with heavily-weighted pages such as this volume is not to be handled comfortably unless it lies on a table. The publishers have done their part in a sumptuous manner. The book adds nothing to geographical information, but it is a well-told story of one of the most progressive of the Latin republics, from the pen of an experienced writer who spent two years in studying Chile on the ground.

The history, government, and trade of the republic, its cities, social life and beautiful homes, culture, agriculture, mining, and aborigines, from the nitrate fields to Tierra del Fuego, are all depicted with pen and camera. The photographs are beautiful, and show every typical aspect of the country and what the Chileans have done to develop the land and advance civilization. One is surprised to see that a few residences which would adorn the suburbs of New York are to be found at Punta Arenas, on Magellan Strait, the most southern city in the world. Some map-makers who still show Juan Fernandez as a single island might read Mrs. Wright's description of these islands with advantage.

By Nile and Euphrates. A Record of Discovery and Adventure. By H. Valentine Geere. xii and 355 pp., 33 Illustrations, a Map of the Euphrates valley, Glossary, and Index. T. and T. Clark, Edinburgh. Imported by Charles Scribner's Sons, New York, 1904. (Price, $3.50.)

Mr. Geere, a member of the staff of the Babylon expedition sent out by the Uni-

versity of Pennsylvania, first visited Mesopotamia in 1895 to assist in continuing the work of excavating the ruins of the ancient city of Nippur. This book is a record of his observations during that and subsequent labours in this field. He gives many interesting pictures of life and work while in the pursuit of archæological finds, describes the people and country of the Euphrates and Tigris, and sketches some of the out-of-the-way places in that unfrequented region.

Nippur lies midway between the Euphrates and Tigris, and the ancient city owes its importance, Mr. Geere says, chiefly to the fact that its great temple is regarded as the home of Bel, "the Father of the Gods." Dr. Hilprecht has identified the bed of the old Shatt en-Nil, which was one of the principal canals of Babylonia, with that "River Chebar in the land of the Chaldæans" upon whose banks Ezekiel saw his vision of the cherubim. The temple has not yet been cleared, but its boundary wall has been found to enclose a space about 150 feet long by 115 wide. It is expected that the next expedition will ascertain the character of the interior of this important building. On his way to Mesopotamia, Mr. Geere visited Egypt, and he compares the excavations along the Nile with similar work near the Euphrates. The fact that the unexplored mounds of Babylonia and Assyria have by no means received the attention given to archæological enterprises in Egypt is doubtless due to the circumstance that foreigners are sometimes made to feel in the Euphrates region that they are not very welcome, that its climate is not to be compared with that of Egypt, that travelling is neither comfortable nor easy, and that the antiquities of the Nile are more interesting to most men than those of Assyria and Babylonia. The author thinks, however, that, in their intimate association with the history of the Old Testament, Mesopotamia and Chaldæa have strong claims to consideration—greater than they have received. Ur, Nineveh, Babylon, and other sites, it has been proved, hold secrets that well repay excavation; and in his opinion America should not lag behind Germany and France in future researches.

The Lure of the Labrador Wild: The Story of the Exploring Expedition conducted by Leonidas Hubbard, Jr. By Dillon Wallace. 339 pp,, 17 Illustrations and Maps. Fleming H. Revell Company, New York, 1905. (Price, $1,50.)

The book has to do with a pathetic romance of exploration. Mr. Hubbard, 29 years old, a magazine editor of New York who was devoted to out-of-door life and had made several trips into the wilds, formed a plan to explore a part of eastern Labrador from north of the Grand River to Hudson Strait where no white man had preceded him. He invited his friend, Mr. Wallace, to accompany him; a half-breed Cree Indian, an expert canoeman, woodsman, and cook, was the third member of the party. They left New York in the spring of 1903 with an equipment that seemed adequate for so small an expedition. The sad tragedy that followed proved that the party was too small to battle successfully with the swift currents and rapids of the rivers, or to carry sufficient supplies through a country in which all game absolutely failed for weeks at a time.

Mr. Hubbard's plan was to ascend the Grand River to Northwest River Post, traverse Grand Lake, and travel up the Northwest River to Lake Michikamau in 64° W. Long., and then from the north end of the lake strike across the country along the George River to its mouth at Ungava Bay on the south side of Hudson Strait. The course of the upper half of the George River has not yet been mapped.

Mr. Wallace says that the best map of Labrador yet made proved to be incorrect as to the Northwest River. The fact is, however, that no Canadian map has yet

appeared in which an attempt is made to lay down the courses of these rivers north of the explored Grand River. The party got into the Susan River, a hitherto unknown tributary of Grand Lake that headed in mountains far to the east of the lake they were bound for. Terribly travel-worn and half starved, Hubbard finally came within sight of the lake he was seeking; but winter was creeping in prematurely, and it was a chance if the party got back to the coast in safety.

Abandoning the proposed northern journey, the retreat to the coast began; but on October 18 Hubbard could travel no farther, and his comrades left him at his tent and hurried on for succour. Wallace gave out later, and the half-breed pushed forward alone. The rescuers he summoned were in time to save Wallace's life, but Hubbard was found dead in his tent.

Mr. Wallace tells admirably the story of this tragical attempt to penetrate an inhospitable and barren country. We see all the grimness of that wilderness and the terrible obstacles over many of which the little party triumphed. It was a thrilling attempt to bring a considerable area of the unknown to the light, but circumstances were cruelly against the ambitious and too venturesome young man who made it.

The journey was not without geographical result. Five tributaries of Grand Lake are indicated instead of the one stream shown on the maps; and the Susan River, heretofore unknown, was ascended to its fountainhead among mountains no white man had seen before. In Mr. Wallace's opinion it is the Naskopie River that connects Lakes Michikamau and Grand, but further exploration will be needed to settle the hydrography of this region. The illustrations are excellent.

Terre-Neuve, Saint-Pierre et le French-Shore. La question des Pêcheries et le Traité du 8 avril, 1904. Par Robert de Caix. 98 pp. Société Française d'Imprimerie et de Librairie. Paris, 1904.

A study of the fisheries question between France and Great Britain in view of the treaty between those countries made in April last. Written by one of the editors of the *Journal des Débats*, who visited the region in question to obtain data for his work.

L'Ouest Africain et les Missions Catholiques. Congo et Oubanghi. Par G. Renouard. viii and 321 pp., 157 Photographs and 4 Maps and Plans. H. Oudin, Paris, 1904.

The author includes among the influences that determine the success or failure of white enterprises in tropical Africa such local phenomena as the quality of the soil, the nature of rivers and marshes—in a word, the geographic environment. He devotes a large part of his book to geographic descriptions of the southern part of French West Africa and adjoining regions into which the Catholic missions have penetrated, believing that European readers cannot arrive at just conclusions as to what is being done to elevate and develop the natives unless they know what are the physical as well as the moral and intellectual conditions.

So he starts with the beginnings of white influence in the days of the pioneer trader, notes the toils, successes, and blunders of explorers, sums up their discoveries, describes the life of the people, their government, and state of culture. He next describes the European organization and government, shows the progress of the natives under the new régime, and finally gives the history of all phases of the work of the Catholic missions and sums up their results. Like a few other books written

by missionaries who have approached their subject from a similar point of view, this volume is an excellent summary of the geography and the advancement of the regions treated.

La Colonizzazione Agricola dell' Eritrea. Dr. Gino Bartolommei Gioli. 90 pp. Bernardo Seeber, Florence, 1903. (Price, lire 2.)

Two lectures before the R. Accademia dei Georgofili early in 1903. Dr. Gioli, with full faith in the practicability of developing Eritrea, and especially the uplands of the interior, by Italian colonization, treats the colony in relation to public security, hygienic conditions, commerce, customs duties, transportation routes, native agriculture, Italian colonization, and the opportunities for Italian capital and labour.

Die Mission in Unsern Kolonien. Von P. Carl Paul. Drittes Heft: Deutsch-Südwestafrika. iv and 166 pp. Illustrations and Map. C. Ludwig Ungelenk, Dresden, 1905.

An interesting narrative of pioneer missionary work in German Southwest Africa. The writer describes the difficulties that met the pathfinders pushing inland, and the war which the remarkable native chief, Hendrik Witbooi, waged upon the whites. He tells how mission work is begun in the barbarous wilderness, how schools and trades are taught, and describes the hard lot of the missionaries resulting from the recent uprising of the natives. A black map shows the railroads built and projected, military stations, mines, Protestant and Catholic missions, and Government schools.

Pionniers parmi les Ma-Rotse. Par le Missionnaire Adolphe Jalla. 359 pp., 29 illustrations, appendices and a map in colors of the country of the Ma-Rotse. Imprimerie Claudienne, Florence, 1903. (Price, fr. 3.50.)

The record of the life and experiences of Mr. and Mrs. Jalla during their long missionary service in one of the most promising parts of tropical Africa, the basin of the upper Zambezi River. Mr. Jalla has spent over twelve years of his life in this work, which brought him into intimate relations with King Lewanika and all classes of his people. Like many of the most interesting and informing books written by missionaries, this volume is an excellent contribution to our knowledge of the people, their mental attitude towards their neighbours and the whites, their habits and customs, their capacity for improvement and much that pertains to the material development of their country. The appendices give the history of the royal family, discuss questions of polygamy and other social relations among the natives, and include temperature tables prepared from observations extending over eight years. A picture of Lewanika as he appeared in London in a Prince Albert coat and high hat contrasts strikingly with views that other photographers have given of him in his native attire.

Der Kongostaat. Von Dr. Karl Freih. v. Stengel. 55 pp. Carl Haushalter, Munich, 1903. (Price, pf. 75.)

A study of colonial-political development in which the writer, who is a German professor of law, discusses the origin of the colony, the legal rights and powers assigned to it, the legal aspects of the methods of development, the governmental organization, and the influence of the policies in force upon the natives and the development of the colony. He sees important advancement in the condition of the tribes that have come under the influence of the Government.

BULLETIN

OF THE

AMERICAN GEOGRAPHICAL SOCIETY.

Vol. XXXVII **1905.** **No. 4**

THE GORGES AND WATERFALLS OF CENTRAL NEW YORK.*

BY

RALPH S. TARR.

NUMBER AND VARIETY.—There are few, if any, regions in the United States where, in so small an area, so great a number and variety of falls and gorges are found as in the valleys near the heads of Cayuga and Seneca Lakes. Many of these are of such wildness

FIG. 1.—ITHACA, N. Y., AND SURROUNDINGS. THE BROAD PORTIONS OF THE STREAMS SHOW THE LOCATION OF SOME OF THE MORE IMPORTANT GORGES. 900-FOOT CONTOUR MARKED BY DOTTED LINE.

and beauty that, near large centres of population, they would long since have won wide reputation and attracted the thousands. Falls in Europe, to which annual pilgrimages are made by streams of tourists, including many Americans, are excelled in beauty and

* A brief abstract of this paper was presented before the International Geographic Congress at Washington in 1904.

interest by scores of falls in the central New York region, to which no names are yet given.

Among the many gorges or glens of this region only one, Wat-

FIG. 2.—ONE OF THE NUMEROUS WATERFALLS, NEAR ITHACA, N. Y.
THIS IS A TYPICAL STEP-FALL.

kins Glen, has attained wide reputation. To this glen tourists come in large numbers each summer; and a gorge nearby, Havana Glen, profits by the reputation of Watkins, and shares in the attention of these tourists. These two glens are beautiful, and it is well

worth one's while to make a long journey to see and enjoy the wild natural scenery which they contain. Yet they are only two of many, and those who know the region well will agree that others are at least their equal. Indeed, to the genuine lover of scenery many of the others have superior attraction, because the natural beauty is not marred by board sidewalks, ladders, and fantastic signs, such as Pluto's Fall, Bridal Chamber, etc., which the exploiters of the glens have deemed it necessary to hang in conspicuous places to arouse the interest of the horde. Nor are the less well-known glens infested with throngs of unsympathetic tourists and pleasure-seekers.

One who loves to wander about in the solitude of wild natural scenery, gaining every now and then a glimpse of a scene of rare beauty, and finding such scenes in quick succession and constant variety, could find employment for weeks, with each day full of interest and pleasure. He would return rested, refreshed, and inspired, and could easily bear away a record of the beauties of the region obtained by camera or by pencil.

The abundance of these gorges and falls in this locality has, of course, an explanation. This explanation is to be found partly in the peculiar physiographic history of the Finger Lake valleys, and partly in the rock structure, to which the details of gorge-form and waterfall outline are largely due. It is the purpose of this paper to consider both the general cause for the abundance of gorges and falls and the explanation for the more pronounced details of their topography. These considerations lead us along a number of different lines.

Topography of the Region.*—The Finger Lakes, of which Cayuga and Seneca are two, are situated in valleys in the dissected plateau of central New York. This plateau, which increases in ruggedness from north to south, is deeply cut by a network of valleys of mature form, the valley slopes, on the whole, being sufficiently moderate for farming, but with some slopes too steep for this, though tree-covered. Where not too steep the hill slopes are usually smooth and thinly veneered with glacial drift; but where crossed by morainic bands the drift-cover perceptibly thickens, and the minor details of topography become varied. Most of the valleys are deeply drift-filled, and often quite flat-bottomed.

Two of the main valleys of the plateau are occupied in part by Lakes Cayuga and Seneca; other similar valleys are partly occupied

---

* For another account of the topography of the region, and a bibliography of the literature on its physiography, see Tarr, Lake Cayuga a Rock Basin, *Bull. Geolog. Soc. Amer. V*, 1894, 339–356.

by the other Finger Lakes, Skaneateles, Owasco, Keuka, and Canandaigua. All these lakes drain northward, and outflow to the east-flowing Seneca River; and if there is any northward continuation of their valleys it is deeply buried beneath drift. The northern, or outlet, ends of the two largest lakes, Cayuga and Seneca, which extend in a general north-south direction, lie beyond the edge of the plateau on the Lake Shore plains, which extend from Lake Ontario southward to the northern escarpment of the plateau region. The southern, or inlet, ends are in the plateau, the hills on either side rising gradually to elevations of 1,600–2,000 feet above sea-level, or from 1 200 to 1,600 above the lake surfaces. The highest and most rugged part of the plateau is several miles south of the heads of the lakes. Along the northern edge of this most rugged portion is the divide between the Finger Lake drainage and that of the south-flowing Susquehanna. The divide of the Cayuga Valley is 14 miles south of the head of the lake; of the Seneca Valley 15 miles.

Each of the Finger Lakes occupies part of a valley which, in its general outline at least, is due to river erosion. The valleys are winding and, at first glance, seem in harmony with the rest of the topography, being merely longer and deeper than the tributary valleys. The length of Cayuga Lake is about 38 miles, and of Seneca 35 miles. Cayuga has a depth of 435 feet and Seneca 618 feet; but that the actual rock bottom is lower than this is indicated by the fact that a well-boring at Watkins, at the head of Seneca Lake, shows that the rock bottom is there fully 1,080 feet below the lake-level. These figures place the rock bottom of the Cayuga Valley at least 54 feet below sea-level, and of the Seneca Valley at least 637 feet below sea-level.

The lateral streams tributary to the Cayuga and Seneca troughs approach in broad, mature valleys to the very edge of the main valleys, and then end as hanging valleys* at an elevation of from 800 to 900 feet above sea-level, or 350 to 500 feet above the lake surface. In the Seneca Valley the bottoms of these hanging valleys are about 1,500 feet, and in the Cayuga Valley about 845 feet above the deepest-known point in the main valley. It is in descending from the edge of these hanging valleys to the lake valleys that the streams have cut the postglacial gorges which are so abundant. In addition to the postglacial gorge-cutting, there has been an earlier period of gorge-cutting antedating the time of deposit of the last glacial drift. These earlier gorges are broader, and hence

* Tarr, American Geologist, Vol. XXXIII, 1904, pp. 271–291.

required a longer period for formation than the postglacial gorges. That they are not postglacial is proved by the fact that they are more or less completely filled with morainic deposits. Where entered or crossed by the postglacial streams they introduce decided variety in the form and characteristics of the postglacial valleys.

THE BED ROCK.—The plateau in which the Finger Lakes lie is made of Devonian strata, mainly shales with sandy layers, increasing in abundance toward the top. There is every gradation from very friable shale to dense, fine-grained, well-cemented sandstone. The sandy beds are usually thin, and there are frequent and abrupt alternations from shale to sandstone. These alternations have an important influence on the form of the gorges and the outline of the waterfalls. The fact that the sandy layers increase toward the top of the series accounts, in part at least, for the greater elevation and ruggedness of the dissected plateau toward the south.

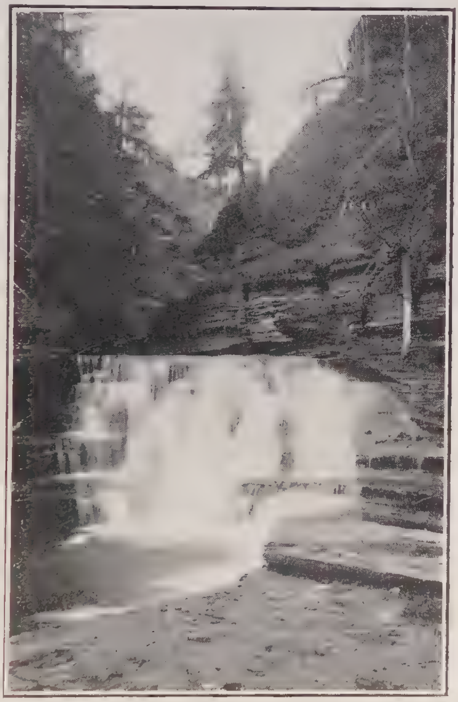


FIG. 3.—A FALL IN ENFIELD GLEN, NEAR ITHACA, N. Y., SHOWING THE INFLUENCE OF THE HORIZONTAL STRATA ON THE GORGE WALL AND WATERFALL OUTLINE.

Besides shale and sandstone there are, in the southern half of the lake valleys, two beds of limestone, only one of which, the Tully, is pronounced enough to produce an influence on the topography. This bed has a thickness along Cayuga Lake of about 15 feet, and, being a dense, massive layer in the midst of friable shales, resists denudation better than the surrounding strata.

All these strata are so nearly horizontal that, in considering their influence on topography, they may be classed as horizontal. However, the strata have a gentle southward dip, and they are slightly disturbed by a series of low folds, with approximately east-

west axes; but these are too broad and low to have a pronounced effect on the topography. The main valleys of Lakes Cayuga and Seneca cross the folds almost at right angles. There are also some very small faults and a number of dikes, whose influence on topography is too imperceptible to call for consideration, excepting in connection with subordinate details. Both the folding and faulting increase southward, beyond the heads of Lakes Cayuga and Seneca, and toward the region of Appalachian folding, with which these disturbances are doubtless connected.

The entire series of strata is crossed by numerous well-developed, approximately vertical joint planes, meeting at very nearly right angles. They vary somewhat in direction, and decidedly in abundance and perfection of development. In places they occur at intervals of a few inches, but more often of several feet, and they are rarely entirely absent in an area of twenty or thirty square feet. Sometimes both series of joints are equally developed, but more commonly one set is better developed than the other. Where opened and exposed by weathering, as in gorges and along the lake-shore cliffs, the joint planes are seen to have variable extent, from short breaks of only a few inches to great planes of breakage, traceable, both vertically and horizontally, for scores of feet. Naturally, therefore, the joint planes exert a profound influence on the topography. This influence is clearly seen in the details of gorge-form and waterfall outline, as well as in stream outline; how much influence it may have had on the larger topographic features is not now clear.

General Physiographical History.—The physiographical history of this region has been long and complex, and at present many of its phases are not understood. That the region has long been subjected to denudation is evident from the mature form of the valleys; but that this history has not been simple and uninterrupted is evident from many facts. Since the drainage history is not fully interpreted, and since much of it has only indirect bearing on the problems of this paper, no further consideration of the vague early history will now be undertaken.

Before the advent of the ice-sheet of the Glacial Period the sum total of the various drainage changes had produced a mature topography not greatly different, in general features, from that now found in the region. Stream-courses may have been different, and in some cases certainly were, and there have been many changes in the details of topography, including the formation of the post-glacial gorges. The advance of the ice-sheet, perhaps repeated

more than once, caused modifications of the topography, the full extent of which is not now apparent. By ice-action valleys were deepened somewhat by erosion; others were shallowed by drift deposit; portions of pre-existing valleys were transformed to lakes; and streams were, in many instances, turned out of their valleys, and even turned over to other systems. But all these changes were minor when compared to the systematic and widely-extended development of mature topography which characterizes the region, and which was the result of a long period of development.

THE HANGING VALLEYS.—At some relatively recent period in the drainage history of the region the hanging tributary valleys joined the main Cayuga and Seneca Valleys at a level not far from that of the 800–900 foot contours.* This conclusion is based upon the established fact that a mature valley has a moderate grade or bottom slope. At present the tributary streams have the moderate grade of maturity nearly to the end of the hanging valleys, then abruptly change their grade, and tumble down the main valley sides in steeply sloping, narrow gorges.

Taking one stream as a type, this change will be readily understood. Fall Creek (Fig. 4) which forms the northern boundary of

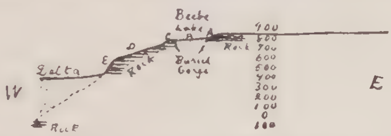


FIG. 4.—PROFILE OF FALL CREEK, WHICH DESCENDS THE CAYUCA VALLEY SLOPE ALONG THE NORTHERN BOUNDARY OF THE CORNELL UNIVERSITY CAMPUS. (VERTICAL SCALE EXAGGERATED ABOUT FIVE TIMES. COLUMN OF FIGURES GIVES ELEVATIONS IN FEET WITH REFERENCE TO SEA-LEVEL.)

Cornell University campus, has an average grade of 20 feet a mile in the first 25 miles of its course. Just above the University the stream quickens, and from this point onward until it reaches the Ithaca delta, which it has helped build at the head of Lake Cayuga, it descends 475 feet in a distance of 1½ miles. Could the lake-waters and sediment-filling of this valley be removed, the stream would descend at least 845 feet in 2 miles. Other streams illustrate the same change in slope; and, in the case of those in the Seneca Valley, taking Watkins Glen as a type, if the tributary streams could be continued down to the rock-floor of the main valley, their descent would be 1,500 feet in 2 miles.

These changes in slope are not due to the turning of streams out

*Tarr. Amer. Geol., Vol. XXXIII, 1904, pp. 271–291.

of their valleys, for there are no buried valleys to be correlated with these mature, upland, hanging tributary valleys. With the exception of small breaks where buried gorges descend to the main valleys, the rock-walls of the main valley sides can be traced continuously for miles along the 800–900 foot contours. Such a decided change in valley profile cannot be associated with the normal development of a mature valley. Therefore, some exceptional explanation must be sought, and this explanation must deal with causes which will account for the lowering of the main valley bottom below the level at which the hanging tributary valleys formerly entered the main valleys.

While there are several possible causes for the lowering of a valley bottom below the level of its tributaries, including block-faulting, only two seem possibly applicable to this region. One of these is ice erosion, deepening the main valley, but not affecting the tributaries, and therefore leaving the tributary valleys hanging above the bottom of the over-deepened main valleys. The other explanation is that some marked increase in the cutting power of the main streams, through uplift or other cause, permitted them to deepen their valleys rapidly, while the side valleys, occupied by weaker streams, were not deepened to such a degree. This new power given to the streams is called rejuvenation.

Ice erosion has been the current explanation of hanging valleys, and was applied to the Finger Lake region by Lincoln * as early as 1892, and by myself in 1894 †. Later studies, have, however, tended to discredit the glacial erosion hypothesis, and to give support to the rejuvenation hypothesis. This subject, and its application to the Finger Lake region, has been discussed in another paper ‡ in which it is shown that, while the evidence at hand is not sufficient to establish the rejuvenation hypothesis, it favors this rather than the explanation by ice erosion.

Whichever of the hypotheses the future discovery of evidence establishes will not alter the fact of main importance, from the standpoint of the present paper—namely, that over-deepening of the main Cayuga and Seneca Valleys has made it necessary for the tributary streams to descend by steep slopes over the walls of the over-deepened lake valleys, and in them to cut the gorges and form the waterfalls with which the region abounds. The fact that the gorge-cutting of the present cycle is postglacial has so limited the time available for valley-deepening that the streams, even where

---

*Amer. Journ. Sci. Vol. XLIV, 1892, pp. 290–301.

†Bull. Geol. Soc. Amer. V, 1894, 339–356.

‡Tarr, Amer. Geologist, Vol. XXXIII, 1904, 271–291.

working in soft shale, and notwithstanding their great slope, have been able to cut only small gorges; and, not being able in this short time to establish a moderate grade, the stream-courses are consequently interrupted by a succession of waterfalls.

THE BURIED GORGES.—In all the valleys so far examined older gorges, more or less drift-filled, have been discovered. In some cases the drift-filling completely obscures the older gorges and causes the postglacial streams to follow an entirely different course to the main valley, but more frequently the buried gorges are revealed by the downcutting of the postglacial streams which cross and, in some cases, follow them for a distance. These gorges are steep-walled, like the postglacial gorges, but are decidedly broader, and hence required a much longer time for their formation. In time of origin they can be certainly placed somewhere between the period of development of the mature tributary valleys and the last ice advance.

For some reason, as yet uncertain, the streams had their power of downcutting increased after the mature valleys were developed, and the result was the cutting of this series of gorges in the bottoms of the mature valleys. As in the case of the over-deepening of the main valleys, there are two possible explanations for this increase in stream power, and the solution of the one problem will solve the other. If the main valleys have been over-deepened by ice erosion the gorges are evidently to be interpreted as the result of stream-cutting during interglacial time, when a new, lower base-level had been established by glacial erosion during an earlier ice advance. If the main valleys have been deepened by rejuvenation through uplift, the side valley gorges represent the measure of cutting which the weaker members of the system were able to perform while the main streams were lowering their valleys to the present depth.

The solution of this problem is not yet at hand; but the fact of importance to the present paper is established—that there is a system of older, partly-buried gorges which must be considered in any attempt to understand and interpret the features of the gorges and falls of central New York. The grade of these gorges is not known, since their bottoms are obscured by drift-filling.

THE POSTGLACIAL GORGES.—When the glacier disappeared, and drainage was re-established on the land which the ice had left, the water followed the lowest courses opened to it. Naturally, in the mature upland valleys the stream-courses were approximately

along the lines of the preglacial drainage, though by drift deposits or other glacial interference, streams were often caused to depart from the exact direction or position of preglacial stream-flow. Rarely, in these upper portions of the larger streams, has the work of erosion removed the drift down to the bed-rock. The valley-bottom grade has not been steep enough for much stream-cutting, and at best the postglacial work has resulted in the erosion of young, narrow valleys in the drift.

Approaching the lower end of the hanging valleys the slope increases, the stream-flow quickens, and the gorge-cutting begins. Thence on to the main valley the tributary streams, large and small, flow almost, if not quite, continuously in postglacial rock gorges, which the streams are now busily cutting in the rock walls of the main valleys. For these reasons there is a decided change in the character of the lower and upper portions of nearly all the streams entering the southern end of the Cayuga and Seneca Valleys (Fig. 1); and this change occurs approximately at the edge of the hanging valleys.

FIG. 5.—WATKINS GLEN, A POSTGLACIAL GORGE WHICH THE STREAM IS NOW RAPIDLY DEEPENING AS IT DESCENDS THE STEEPENED SLOPE OF THE SENECA VALLEY IN A SUCCESSION OF LEAPS.

Near the level where this change in slope occurs there have been two prominent causes for an unusual depth of drift. One of the lateral moraines of the Cayuga and Seneca Valley ice-tongues extends at about this level; and at a still later stage, when the retreating ice-sheet stretched across these lake valleys, forming a great ice-dam, delta terraces of gravel and sand were built at the mouth of each of the streams in the temporary lake. These drift obstructions have decidedly modified the courses pursued by the streams

below the edge of the hanging valleys. Therefore it happens that, although there are pronounced earlier gorges extending down the slope below the edge of all the hanging valleys, and sometimes forming distinctly-marked depressions in the main valley slope, the postglacial streams do not always follow them, or, if they do, in many instances follow them for only a part of the distance. This fact has a profound influence on the forms assumed by the gorges of this region.

EFFECT OF BURIED GORGES.—Where a postglacial stream coincides with a section of a buried gorge, it has had an easy task to perform, merely stripping away the glacial drift. Since the buried gorges are broader than the postglacial rock gorges the valleys cut in postglacial time are distinctly broader where they coincide with the older gorges than where a new gorge has been cut in the rock. Furthermore, the buried gorges were cut to a greater depth than has been possible in the brief postglacial time, and therefore those streams which coincide with the buried gorges in their lower ends have deeper valleys than those which occupy postglacial gorges in their lower ends.

This condition may be well illustrated by briefly considering two contrasted instances. One of these is lower Six Mile Creek, which enters the Cayuga Valley from the east at Ithaca. About one mile from the point where this stream emerges upon the Ithaca delta it is flowing in a narrow postglacial gorge cut in the northeast wall of the buried gorge. In this section a picturesque fall has been developed. The stream then enters the buried gorge, whose further course upstream is partly hidden by drift deposits. In consequence of the discovery of this buried gorge by the stream the valley abruptly broadens, and this condition continues to the point where the creek emerges upon the Ithaca delta. This broad lower valley is a rock-walled gorge, with precipitous sides, but with the rock bottom nowhere revealed. The postglacial stream has only partially removed the drift-filling of the earlier gorge.

Of exactly the opposite type is Buttermilk Creek, the next stream to the south on the same (east) side of Cayuga Valley. At about the 800-foot level—that is, at the edge of the hanging valley—the creek is turned by moraine and delta deposits entirely aside from its buried gorge section. Consequently it enters the Cayuga Valley over the rock wall of the main valley several hundred yards south of the buried gorge, whose course is plainly traceable by a deep sag in the hillside and by occasional outcroppings of the gorge walls above the moraine-filling. Because of this diversion

of the creek, the postglacial work of lower Buttermilk has been entirely in the bed-rock; and below the 800-foot level the gorge is, therefore, entirely of postglacial origin. It is in striking contrast to lower Six Mile Creek; for its gorge is narrow, the rock is everywhere present in its bed, and the slope is so steep that the stream forms a succession of rapids and falls. For part of the distance the stream flows almost flush with the main valley wall, having been incompetent to wear down its bed sufficiently to form a deep gorge.

Between the extreme types of Six Mile and Buttermilk Creeks there are numerous gradations; and there are a number of gorges which are possibly due to a combination of early and postglacial gorge-cutting. Lower Fall Creek, lower Taughannock, and a number of smaller streams are in broad gorges, with rock bottoms. In these instances it has not been proved beyond question, as it has been in Six Mile Creek, that the earlier gorge is occupied by the postglacial stream, and future study may prove that this is not the case; but the great breadth of these gorges is otherwise difficult to explain.

In several cases streams of similar volume, in approximately the same kind of rock, and with about the same grade, are occupying gorges markedly different in width and depth. This may be illustrated by comparing two small stream gorges with that of Buttermilk. Lick Brook, south of Buttermilk, and Esty Glen, north of Ithaca, both on the east side of the valley, have cut more pronounced gorges than lower Buttermilk, which is unquestionably entirely postglacial. Yet Buttermilk has much greater volume of water than either of the others; the grade of Buttermilk Creek is as great as that of Esty Creek and nearly as great as Lick Brook; and the rock is not greatly different. I am at a loss to account for this discrepancy on any other hypothesis than that both the Lick and Esty streams are occupying their earlier gorges; and this explanation is further strengthened by the fact that the older gorges of Esty Glen Stream and Lick Brook have not been found. A similar explanation is offered to account for many other cases of broad, deep lower gorge sections. It cannot be considered established; but with further investigation, now in progress, the correctness of the hypothesis will doubtless be fully tested. If this hypothesis proves incorrect, some other explanation will need to be found for the very striking difference in the depth and width of gorges which at first sight seem to be entirely postglacial in age.

In still another way the buried gorges influence the valley-

forms. Where the streams cross the moraine and delta deposits, near the point where the slope changes from that of the hanging valleys to that of the main valley walls, they have often been given an irregular course. In the down-cutting through the drift to the underlying rock this postglacial course oftentimes leads to a cross-sectioning of the buried valleys, which the postglacial streams usually cross diagonally. This is exceedingly well illustrated in middle Six Mile Creek (Figs. 6, 7 and 9) above its lower course in the buried valley described above. Three times the creek crosses its buried

FIG. 6.—AN "AMPHITHEATRE" IN SIX MILE CREEK, LOOKING DOWN STREAM TOWARD THE DAM SITE (FIG. 7), WHICH IS SITUATED AT THE LOWEST POINT IN THE SKY LINE. THIS AMPHITHEATRE IS NOW FLOODED BY MEANS OF A DAM IN THE POSTGLACIAL GORGE (FIG. 7).

gorge, each time entering it through one wall and leaving it across the opposite wall. In each case the valley-form changes abruptly as the stream enters and leaves the buried gorge. The postglacial section, cut in the buried gorge wall, is always narrow, with rock walls and rock bottom, over which the stream flows with rapids, or falls, or both. But in emerging into the buried gorges the valley abruptly broadens, rock is absent from the stream-bed, and on each side there is a section where rock is entirely absent from the valley sides. In these broad sections the stream meanders, forming terraces in the drift. Such broad sections are locally known as "amphitheatres." They make excellent sites for ponds, the outlet gorges being excellent dam sites (Fig. 7), and the breadth and gentle bottom slope of the "amphitheatres" being well suited for the

existence of ponds. Two of the "amphitheatres" of Six Mile Creek have been utilized for this purpose.

Other streams show the same condition. One of the best instances is that forming the site for the pond, called Beebe Lake, which contains the water supply for Cornell University and supplies the power for lighting the University and for its hydraulic laboratory. This is in Fall Creek, which forms the northern boundary of the Campus. Just above Forest Home, about one mile east of the University, the creek is in the older gorge, having up to this point a moderate grade in the hanging valley. At Forest Home the creek turns northward, having been deflected by a morainic spur; and, on cutting down through the moraine, it has encountered the rock of the northern wall of the buried gorge. In this a narrow postglacial gorge has been cut, with several rapids and falls. In the course of a few hundred yards the stream turns and reenters the buried gorge, which it crosses diagonally, entering the rock of the south wall at a distance of about a quarter of a mile from the point where it entered the buried gorge. Here it cuts another postglacial gorge with a series of very beautiful falls, much of whose beauty still remains, notwithstanding the building of a dam and the construction of a hydraulic laboratory in the gorge.

FIG. 7.—POSTGLACIAL GORGE IN SIX MILE CREEK, BELOW AN AMPHITHEATRE (FIG. 6). THIS IS NOW OCCUPIED BY A DAM AND A POND FILLS THE AMPHITHEATRE ABOVE.

These descriptions may be considered typical of conditions which are very common in the tributaries of Cayuga and Seneca Valleys. In this way scores of narrowing and broadening sections of the gorge valleys are explained.

EFFECT OF STRATA.—Being horizontal, the effects of differences in the strata on the gorge-form and waterfall outline are all of one general nature. On the gorge-walls the variations in texture cause a nearly horizontal banding, due to differences in resistance to weather-

ing by the various strata. The effect varies greatly (Figs. 2, 3 and 5) according to the thickness of the various strata, the differences in durability of the successive layers, and the frequency of occurrence of hard layers. Every gorge shows some effect of this influence in the minor details of gorge-form; and sometimes it is very pronounced, especially where there are fairly thick layers of unusual hardness. In such cases there is sometimes an overhanging of portions of the gorge-wall where either undercutting by the stream or weathering out of weak strata has occurred beneath hard layers. These differences in rock strata are, however, nowhere great enough to give to the gorge-walls a distinctly terraced form.

The resistance of durable layers to the down-cutting of the streams is the cause for most of the rapids and falls of this region; but there are many differences among the falls, as a result of the varying conditions under which the strata occur. The differences in influence of strata may best be illustrated by means of a few type cases.

Only one of the strata of this section, the Tully limestone, is thick and massive enough to cause high falls over a single layer. Wherever the water flows over this layer, even in small streams, there is a pronounced fall, which, in all respects but size, closely resembles Niagara. The undermining of this limestone by removal of the underlying weak shale leaves it overhanging; a pothole is bored out at the base of the fall; and, by the falling of undermined blocks of the horizontal limestone, the fall gradually retreats upstream.

On a much smaller scale a similar condition is introduced by scores of thin sandstone strata. Usually, in such cases, only a low fall is caused, or perhaps no more than a rapid. Where the hard strata are near together the combined effect of several produces a step-fall (Figs. 2 and 3), which may attain considerable height if there are enough hard layers. Such a fall seems inclined, when viewed as a whole, but actually consists of a series of step-falls, each set a little back of the next one below. The inclined step-falls, well illustrated by Buttermilk Fall, are very often found where the postglacial stream has been precipitated down the steep face of the main valley wall into which time has not yet permitted the cutting of a deep gorge. On account of the exceedingly great variety in thickness, number, and spacing of the hard layers there is a great variety in the form of the falls, as may be inferred from the accompanying pictures.

Effect of Joint Planes.—The details of gorge and waterfall form are profoundly influenced by the joint planes, by the aid of which

the rock cleaves readily along the nearly vertical planes, which meet at almost right angles. This causes a rectangular buttressing of the gorge outline as one of the most characteristic features of the gorge-wall form (Fig. 8). The presence of several joint planes close together often permits the formation of a narrow chasm; and a combination of two such sets, at right angles, at times isolates a

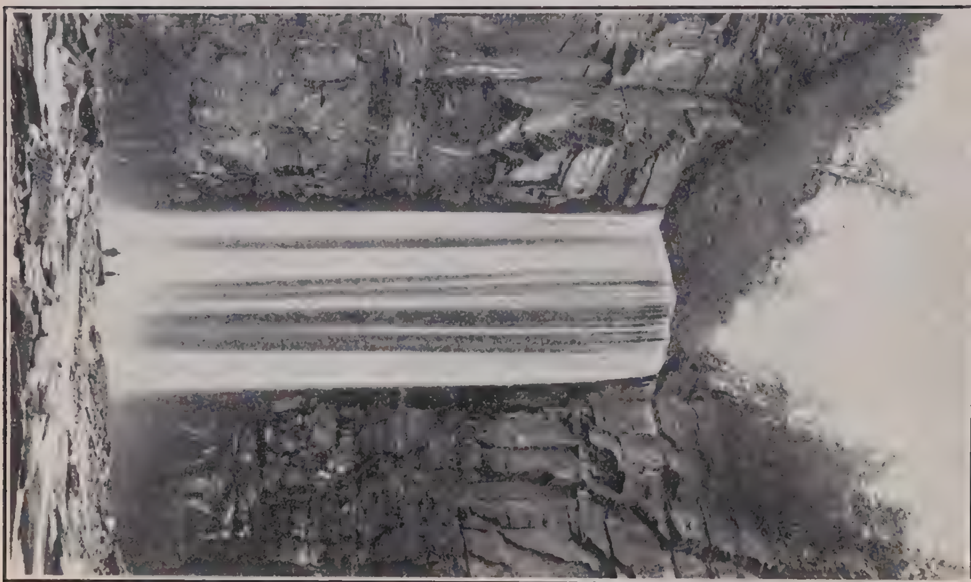
FIG. 8.—BUTTRESSES ON WALL OF FALL CREEK GORGE ITHACA, N. Y., DUE TO THE INFLUENCE OF JOINT PLANES.

portion of the gorge-wall, leaving it standing as a column. The falling away of fragments along the joint planes leaves many smooth faces on the gorge-walls; and the formation of talus slopes at the bases of the cliffs, as well as the widening of the gorges, is greatly facilitated by the influence of the joint planes. Fresh scars caused by the recent falls of fragments weathered loose along joint planes may be seen each spring in most of the gorges.

The streams are often deflected by joint planes, sometimes occupying the space between two joints for a long distance, then, perhaps, turning at right angles to follow the other set for a distance. The presence of these joints greatly facilitates the stream work of valley-deepening.

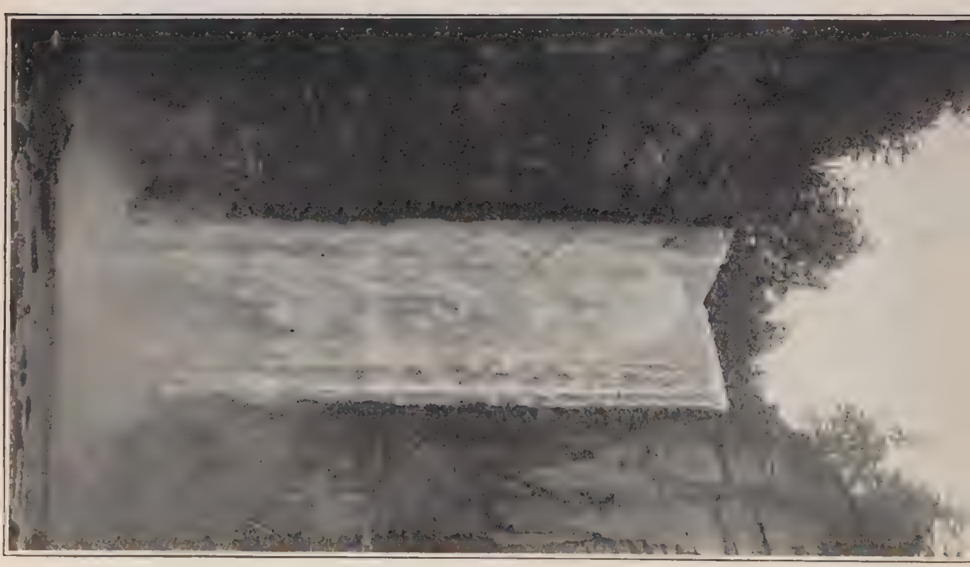
Even more marked is the influence of joints on the form of the waterfalls. They guide the water in its course, often causing angular outlines in the waterfall (Fig. 9); and, by causing the rock to cleave, they sometimes give to the fall a vertical form where otherwise the stream would have an inclined slope. This is exceedingly well illustrated in the extreme case of Taughannock, the highest waterfall in the State, which has a vertical fall of 190 feet. There is no hard layer at the crest of Taughannock, but the fall occurs at a part of the gorge where both sets of joint planes are exceedingly well developed. At intervals varying from a few inches to several feet the joint planes cut the rock into vertical sheets, in some cases extending from the top to the bottom of the gorge. Frost and weather cause the rock to cleave along these planes so frequently that the face is left vertical. The very outline of the waterfall crest is determined by the joints. At present (Fig. 10) the outline of the crest is a re-entrant angle, due to the meeting of two joint planes; a few years ago (Fig. 10) the crest of the fall protruded to the opposite angle of [the rhomb formed by two other parallel joint planes. The fall of the rhombic (almost cubical) block enclosed by the joint planes has caused a decided change in the outline of the

FIG. 9.—GREEN TREE FALL, SIX MILE CREEK, NEAR ITHACA, N. Y., SHOWING INFLUENCE OF JOINT PLANES ON WATERFALL FORM. THIS FALL IS AT THE POINT WHERE THE CREEK EMERGES FROM A POSTGLACIAL GORGE INTO ITS BURIED GORGE AT THE AMPHITHEATRE (FIG. 6). THIS IS IN THE NORTH WALL OF THE BURIED GORGE; FIGURE 7 IS IN THE SOUTH WALL.



TAUGHANNOCK—OLD OUTLINE.

FIG 10.—TAUGHANNOCK FALL, NORTH OF ITHACA, N. Y., ON WEST SIDE OF CAYUGA LAKE.



TAUGHANNOCK FALL—NEW OUTLINE.

DUE TO RECESSION BY FALLING AWAY OF A JOINT PLANE BLOCK.

fall. Almost every waterfall of good size is influenced either slightly or profoundly by the joint planes.

INFLUENCE OF THE GORGES AND FALLS.—In many ways these gorges have influence on life. They are usually a wilderness in the midst of a farming region. Therefore their flora and fauna are different from that of the surrounding land; and this difference is increased by the dampness and shade of the narrow gorges. To show the exact amount of difference in life is a task for the ecologist.

These strips of wilderness cut up single farms and interfere with communication between neighbouring farms. They deflect roads or else cause the construction of expensive bridges. For example, until four or five years ago there was no road bridge across the Fall Creek gorge, although it forms the northern boundary of the Cornell Campus, and the University buildings extend to the very edge of the gorge. The building of a bridge quickly opened up the region on the opposite side of the gorge, and in five years it has become one of the important residential sections of Ithaca.

The gorges also influence the railroads. Thus, the Delaware, Lackawanna and Western Railway enters Ithaca by means of a switchback, causing an increase in distance and consequent delay, and introducing a very heavy grade, down the steepened valley slope, to avoid the expensive construction necessary to enter by a more direct course—along the Six Mile Creek valley, into which enter many small tributaries in deep gorges. The Lehigh Valley Railway decided against the Ithaca route for its main line, building a double-track road, at heavy expense, through the Seneca Valley, at the level of the steepened slope, above the upper ends of the gorges. To use the Ithaca route it was necessary either to descend to Ithaca by steep grade and ascend by even steeper grade, along the route followed by the present Ithaca branch, or else to establish a grade on the hillside and bridge a number of deep gorges.

As already stated, the amphitheatres are natural sites for storage reservoirs, and are used for this purpose in a number of instances, partly for water supply, partly for power. The Ithaca water supply, as well as that of Cornell University, is at present obtained from the creeks, dammed at the lower ends of amphitheatres. The many falls give ample opportunity for power wherever the water supply is sufficient. Unfortunately, in most cases the water supply is limited and variable, and the variability is being steadily increased by the continued removal of the woodlands, thus making this source of power even less useful than formerly. The

creeks, at times roaring torrents, are greatly lowered in summer by drought, and in winter by frost; and industries requiring steady power are in many cases required to supplement the water-power by steam. Yet there are numerous small industries, such as grist mills, which make use of the power. Ithaca owes its early growth in part to the water-power available in the neighbouring creeks.

The use of the creeks for this purpose is diminishing, and at present the most varied and extensive use of water-power in this neighbourhood is that made by Cornell University, which obtains from Fall Creek not only its water supply, but also power for developing electricity for lighting its buildings, power for the engineering shops, and water for its hydraulic laboratory.

Not the least important influence of the gorges and waterfalls is the influence of their beauty on those who know them. This influence defies attempt at quantitative statement. It has a direct money value in the case of Watkins and Havana Glens, where there are gate receipts for entrance; but the value to the many tourists cannot be estimated. The reputation of Watkins Glen has led to an effort, maintained for several years, but as yet unsuccessful, to have it made a State Park.

Even more important than this, however, is the influence of the beautiful scenery upon the throngs of students who attend Cornell University. Some, it is true, never see any of the natural scenery excepting that which is forced upon them in crossing the gorges as they pass to and fro from their work; but the majority explore the gorges near by, and many extend their explorations far and wide. The influence of beautiful surroundings on character is unquestionably great, and the thousands who study at Cornell University have this influence thrust upon them.

THE VICTORIA FALLS OF THE ZAMBEZI.

Mr. A. J. C. Molyneux has a very interesting article in the *Geographical Journal* (January, 1905) on the physical history of the Victoria Falls. He expresses the opinion that the theory of Dr. Livingstone that a deep fissure was opened in the earth's crust across the bed of the Zambezi, the Victoria Falls being the result of this convulsion of Nature, is not correct, though still generally accepted. "I hold the firm conviction," says the writer, "that here, no less than at Niagara, the combination of cañon, gorge, chasm, and falls is due to the ever-reducing action of moving water, eating back with relentless energy, year by year, and age after age, into the hard and stubborn wall of igneous rock."

The article is illustrated with some fine views of the Falls. The accompanying map is reproduced from the *Geographical Journal*, in reduced size.

In his paper Mr. Molyneux applies names as follows: "The Chasm" is the cleft into which the river falls; "The Gorge" (that is, the throat) is the exit as far as the "Boiling Pot"; then the "Grand Cañon" commences and extends for 40 miles.

Summing up the various features of the Falls, Mr. Molyneux says that the chasm across the river is little more than 1,860 yards long—the same as the breadth of the river—that number being fixed upon as indicating the year in which the Falls were first carefully observed. The lip of the Falls is subdivided by natural features, as follows:

Nearest to the right bank is the misnamed "Devil's Cataract" ("Leaping Water" of Baines), 36 yards wide—a sloping mill-race that carries much water when many other portions are dry at low water. Next comes the island of Boaruka, about 200 yards wide, cut by a stream and fissure through which water pours at flood times; then comes the Great Fall, 573 yards broad, divided from a second fall of 325 yards by a projecting rock. At the east end of this fall is Garden Island, now known as Livingstone Island, lying on the very edge of the precipice, some 1,170 yards from the west side and 600 yards from the east shore. At the end of the chasm is the Eastern Cataract, a mill-race something similar to the "Leaping Water." This part of the Falls east of the island is mostly bare in the time of low water, and then gives passage to many isolated and narrow streams. The west end of the chasm is but 256 feet deep, as measured by Mr. Mansergh, the railway engineer, increasing to 343 in depth at the orifice of the chasm and increasing to 400 feet below the Boiling Pot. The chasm near each end is not more than 80 or 100 feet wide, increasing to 240 feet in the centre.

The water dropping over the Falls nearest the banks has now to turn at right angles and run the gauntlet past that falling over the centre, for the only outlet is the gorge of about 100 feet in width. Here, again, the right angle is in evidence, and the southerly course is now resumed. But not for long; 130 yards farther it enters the Boiling Pot, and emerges therefrom to run in a trench of 1,170 yards long parallel to the first. Only the portion of this parallel trench west of the Boiling Pot is occupied by the stream, the eastern end being now dry, and nursing in its sunlit depths the vegetation of the Palm Kloof. This end is divided from the chasm by a very narrow ridge of rock called the Knife Edge, the western end by a wide promontory (on which river pebbles can be found), with a base 416 yards wide, now carrying the Rain Forest. In the

writer's opinion this is an old Falls chasm, dating from a time when the river passed over the ridge now occupied by the Rain Forest promontory, Danger Point, and the Knife Edge, the depression at the east end of which is the extension of the eastern cataract.

At the land end of the Rain Forest promontory the cañon takes a bend at an acute angle to the east in a third cleft, then glides round a third promontory to form a fourth chasm running westward. Beyond this the zigzag course continues, and little is then known of its vagaries through the forty miles of the Grand Cañon.

In considering the processes which formed the falls, Mr. Molyneux says that the river has removed the upper strata of fine sandstones, and consequently the level of the stream, the lower flats of the valley, the ends of the chasm, and the edges of the gorge and cañon can be seen to be of the same horizon of basaltic rock (Columnar). The apron of water and inaccessibility prevent one seeing if the hard-top sheet extends in depth for the whole 400 feet of the chasm, but down the cañon it can be noticed that the lava lies in beds of varying thickness. The examination of these strata is not possible unless one is slung over the precipice—a feat not yet attempted. The hard surface is a basalt more or less amygdaloidal, on the degree of which quality depends its want of tenacity.

As is common to all rocks of this nature, it is full of cracks and fissures, due to contraction on cooling, and though it does not assume the perfectly regular hexagonal columns of the Giant's Causeway, or of Staffa, yet it frequently resembles them, the vertical cracks producing a general columnar form. The columns thus defined may be seen when the water is low, along the lip of the falls and beneath the clear and rushing current of the "Leaping Water" (Devil's Cataract), more or less truncated as the verge is reached, and bearing but little evidence of attrition. Indeed, evidence of actual wearing away of the angular edge of the precipice is conspicuously absent, and the level of the stream is almost unchanged up to the very lip of the falls. Only at the two cataracts at the ends of the chasm can the process of trituration be called in aid as a demolishing agent, and even here it is probable that the columns have been truncated by the action of the rushing water forced into the horizontal joints.

Mr. Molyneux believes that the cutting back of the edge is due to the perpetual hammering action of the vast bodies of water falling into and down upon the cracks between the basalt columns, assisted by the constant vibration of the rock from the precipitated

masses of water, and that by this constantly exerted force the columns are rent asunder and fall into the chasm, taking with them huge and deep flakes of the precipice. At low-water heaps of these blocks, as yet angular and unreduced, may be seen in the shallower ends of the chasm.

While there are signs some distance away that the basalt-flows are bedded in various degrees of tenacity, there is no sign of undermining of the rock that forms the rim, as at Niagara, and so leaving that rim without support; rather does the lower portion of the precipice at places protrude outwards. But the breaking down of the rock is mostly columnar; hence the almost vertical walls of falls, chasm, gorge, and cañon.

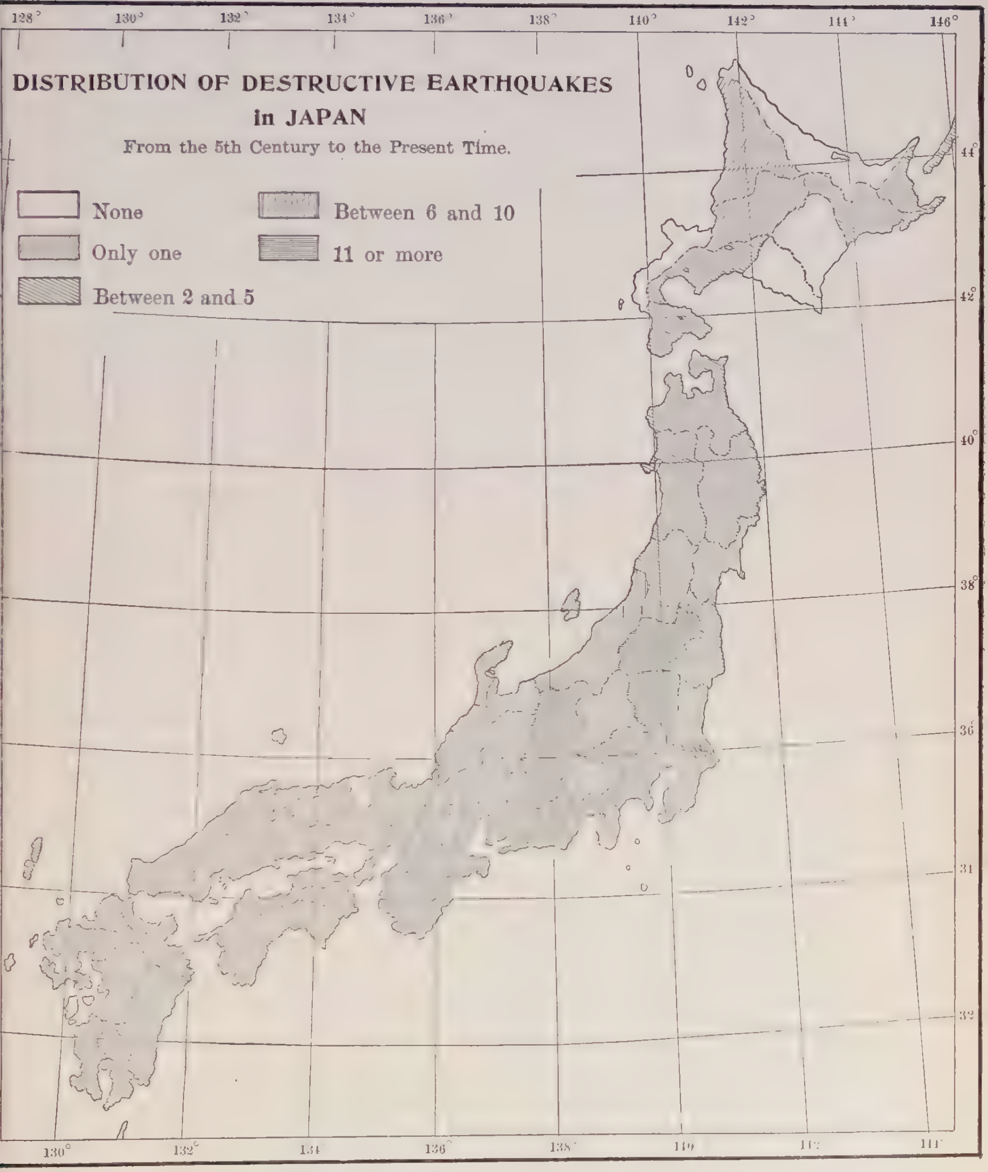
The writer thinks such are the causes that have played the most important rôle in the trenching of this length of forty miles.

EARTHQUAKES IN JAPAN.

The number of earthquakes in Japan in the year 1903 was 1,349. The *Publications of the Earthquake Investigation Committee*, No. 19, says that this is by no means more than the annual average. While Japan is pre-eminently a land of earthquakes, the shocks that are sufficiently severe to cause loss of life or serious damage to property are not numerous when compared with the total number of movements. Since 1872 fifteen earthquakes in Japan have been attended with serious consequences. It is only within a comparatively short time that the invention of the seismograph has made it possible to take note of the minor shocks; but over 2,000 earthquakes were recorded in the history of Japan between 416 and 1867 of the Christian Era.

The accompanying map is taken from No. 19 of the *Publications.* It shows the distribution of earthquakes that have caused loss of life and large destruction of property in Japan from the Fifth Century to the present time. There have been in all 223 of these violent earthquakes; 149 were limited in their destructive effects to one province of the empire and 74 extended over two or more provinces. Destructive earthquakes on the concave or Japan Sea side of the archipelago, as a rule, have smaller extent than those which occur on the convex or Pacific side. Of the 223 destructive

earthquakes, the place of origin of 47 was plainly in the Pacific; of 17, in the Japan Sea; of 2, in the Inland Sea; while the epicen-



tral tract or place of origin of 114 was inland, and the origin of 43 shocks was obscure. Of the 47 destructive earthquakes of Pacific origin, 23 were accompanied by *tsunami* or sea-waves, which have

often caused much more damage than the earthquakes themselves.

It is seen from another map in the *Publications* that the sea-waves accompanying earthquakes are almost entirely confined to the Pacific coast, there being only two exceptions.

One of the most destructive earthquakes was the great Mino-Owari catastrophe in October, 1891, in which over 7,000 people were killed, over 17,000 injured, and nearly 20,000 buildings destroyed, besides many bridges and other public works. It was this calamity that led to the establishment of the Earthquake Investigation Committee to discover (1) whether there are any means of predicting earthquakes, and (2) to ascertain what may be done to reduce the disastrous effects to a minimum by the choice of proper structures, materials, building sites, etc. This Committee, taking a liberal view of its functions, has not hesitated to make any investigations that would throw light upon the whole subject. The Committee is composed of twenty-four members, all scientific men or engineers, and it has thus far published forty-seven reports in Japanese and sixteen in foreign languages, chiefly English.

The recent seismological investigations in Japan are almost wholly the work of the Committee, in conjunction with the Seismological Institute of the Tokyo University.

Its statistical work consists chiefly of collecting records and reports of earthquakes and of the destructive sea-waves that accompany some of them. From these data are deduced the distribution of earthquakes in time and area; their relation to the seasons, the phases of the moon, the time of day, and the meteorological conditions.

Instrumental observations are carried on with seismometers and seismographs. These investigations include inquiries into the construction of instruments, their improvement, the invention of new ones, etc. From these observations are deduced the nature of the vibrations of earth particles, their amplitude and period, the velocity of earthquake waves, etc. As seismographs now record earthquakes the world around, the Committee has the means of studying the effects of distant earthquakes in Japan.

The geological investigations include reports of volcanic eruptions, geological dislocations, etc. Under this heading comes also the Vulcanological Survey, whose object is "to study the new and old volcanoes of our country as regards their internal structure, their rocks, their foundations, and their modes of distribution," so

as to be able to get "an insight into the structure of the land"; and " to construct the geotectonic map, by means of which we may possibly learn the conditions underground and the causes of regional shaking and the local points of earthquakes."

There are also investigations of such physical phenomena as may have some relation with seismic phenomena with a view to ascertaining whether such relation actually exists, and, if so, what is its nature. Among these are earth magnetism, gravity, underground temperatures, and elasticity of rocks.

A practical side of the work is one of the two ultimate objects for which the Committee was organized. It comprises investigations of earthquake-proof structures, best forms of chimneys, piers, columns, etc.; the strength of materials and combinations of materials, and so on. The committee has also extended its work to the application of seismometrical instruments, to the measurement of vibrations of the ground, and of vibrations of buildings and structures, due to causes other than earthquakes, such as passing of trains over bridges, hammering in factories, and the like, and to an examination of their effects.

The Committee has given much study to the construction of brick and wooden buildings that shall be as nearly earthquake-proof as possible. A number of plans and elevations of such buildings, and the methods of bracing and strengthening them so that they shall offer all possible resistance to earth movement, appear in *Publication* 19.

An International Seismological Association is now in course of organization. It is expected primarily to concern itself with the study and discussion of earth movements. The hope is expressed by the Japanese Earthquake Investigation Committee that it may, either by itself or in co-operation with other bodies, take into consideration all the principal problems relating to seismology.

The Japanese Committee has done some work which in its application will be useful in many countries. Such results, for example, as the determinations of the vibrations of railroad bridge piers, of the deflection and vibrations of girders and trusses, of vibrations of railroad and electric cars and of ships, will be of interest and use to engineers in all parts of the world.

The report says with regard to the prediction of earthquakes that it is not to be expected that the Committee should be able to accomplish so difficult a task within a short time; but there is no reason to assume that by persevering in this and other lines of investigation such a knowledge of earthquakes may not finally be

attained as to justify earthquake predictions. This view will probably be regarded as sanguine by the important number of seismologists who say that, as yet, not a particle of progress has been made in this direction, and who believe that predictions of some merit, but still large liability to error, would almost be worse for the people of earthquake countries than the calamities themselves.

LAUNCHING OF THE "ROOSEVELT."

The Peary Arctic Club's new ship was launched at Bucksport, Me., March 23, at 12.35 P.M.

Conditions of weather and tide were particularly favourable, and the event was characterized throughout by uniform smoothness.

When the binding timbers which held the ship on the ways were severed, Mrs. Peary smashed a bottle of champagne, imbedded in a block of ice, against the ship's stem, and christened her "Roosevelt."

The ship slid slowly and smoothly into the water, and moved gracefully across the narrow channel of the Penobscot, where she was taken in charge by a tug and towed to her pier.

Telegrams were immediately sent to President Roosevelt, and President Jesup, of the Club.

Some 5,000 visitors witnessed the launching, and greeted the vessel and her name with cheers.

The official measurements of the ship are: length, 182 feet; breadth, 35.5 feet; depth, 16.2 feet. Her mean draft will be 16 feet, and her full load displacement about 1,500 tons.

The preliminary plans and studies of the ship, embodying Peary's ideas, were prepared by Wm. E. Winant, Naval Architect in the Bureau of Construction and Repair of the Navy.

On these plans expert opinions were secured, and various modifications made. Finally the massive construction and essential special features of the ship were clothed by the builder, Capt. Chas. B. Dix, of the firm of McKay & Dix, in the graceful lines of our Maine-built coasting schooners.

Noticeable features of the "Roosevelt" are the pronounced rake of her stem, sharp wedge-form of the bows, a raking rudder-

THE "ROOSEVELT" AFLOAT, AT BUCKSPORT, MAINE, MARCH 23, 1905.

post, and generally rounded form of hull. At the same time the ship does not depart widely from recognized models, and, in addition to special fitness for her special work, it is hoped and believed that she will prove to be an able and seaworthy craft in the usual acceptance of the terms.

In the evening of the day of launching the "Roosevelt" started for Portland in tow of a tug, and the installation of the machinery began the following afternoon, at the works of the Portland Company. It is hoped that this installation will be completed and the ship go into commission in May.

During the thirteen-hour voyage, a portion of which was quite rough, with strong wind, the ship gave gratifying indications of easy propulsion, stability, and ready attention to the helm.

The "Roosevelt" is not the Peary ship, but the ship of the Peary Arctic Club—that organization of generous, public-spirited men who have contributed to her construction.

And while several members of the Club have contributed most generously, the fact that she is afloat and an actuality to-day is due entirely to the broad faith and courage of the President of the Club, Morris K. Jesup, who last summer, when the funds of the Club were insufficient to pay for the ship, personally assumed the responsibility, signed the contract, and guaranteed the payments.

Spurred by his splendid example, others have come forward, and the funds for the completion and equipment of the ship are assured. But funds for the current expenses of the expedition (some $30,000) have yet to be raised.

GEOGRAPHICAL RECORD.

AMERICAN GEOGRAPHICAL SOCIETY.

TRANSACTIONS OF THE SOCIETY, MARCH, 1905.—A Regular Meeting of the Society was held at Mendelssohn Hall, No. 119 West Fortieth Street, on Tuesday, March 28, 1905, at 8.30 o'clock P.M.

Vice-President Moore in the chair.

The following persons, recommended by the Council, were elected Fellows:

Linnæus Edford LaFetra.
Henry V. A. Parsell.
Henry A. Wise Wood.
Frank Klepetko.
John W. Wainwright.
Albert A. Wray.
Lewis Buckley Stillwell.
Charles Albert Whittier.
J. E. Bastin.
W. H. Rossington.
S. Zickel.
Joseph Wood.
Archibald Watt.
James Speyer.
H. P. Ulich.
H. O. Havemeyer, Jr.
Henry B. Spencer.
John Jay.
Sanford E. Cobb.
Fred E. Smith.
Charles H. Manning.
Frederick K. Mixer.
Francis J. McQueeney.
John E. Wilson.
J. S. Lemon.
Edwards Spencer.
Benjamin C. Williams.
Dillon Wallace.
Gustav L. Wilmerding.
Marshall S. Snow.
George E. Dimock.
John A. Just.
David H. Gaines.
Edgar S. Barney.
Robert Morris Pierce.
Edward Lindsey.
Charles Edwin Eaton.
Robert H. McCormick, Jr.
Louis Mohr.
C. M. Hobby.
Orlando Metcalf.
Dr. Eugene Murray-Aaron.
William D. Hoxie.
John Gilbert Ward.
Isaac Pitman Noyes.

The Chairman then introduced the speaker of the evening, Mr. Harlan I. Smith, who addressed the Society on Recent Archæological Discoveries in North Western America. Stereopticon views were shown.

On motion, the Society adjourned.

AMERICA.

THE GEOGRAPHICAL SOCIETY OF MINNESOTA.—American geographers will welcome the organization of this new Society, which has been formed in the hope of stimulating an interest in geography, especially among the teachers of Minnesota, so that they may study the subject more systematically and obtain better results in teaching it. Any student or teacher of geography in Minnesota may be elected a member. The Society was organized at the University of Minnesota, and Prof. C. W. Hall of the University was elected President, and Mr. Charles E. Flitner of St. Paul Secretary-Treasurer. The Society will have lectures, papers, and discussions under its auspices; arrange for field days and excursions, and make exchanges of

photographs, books, and illustrative material. At the first annual meeting of the Society, on December 27 last, Mr. E. V. Robinson read a paper on "The Panama Canal as a Factor in Industrial Geography"; Mr. F. W. Sanderson on "The Meeting Place of Geography and Geology"; and Mr. F. M. Ball of Minneapolis on "A New Method in Grade Geography." Each of the papers was discussed by the members. Ten cities of the State are thus far represented in the membership.

AGRICULTURAL EXPERIMENT STATIONS IN ALASKA.—Prof. C. C. Georgeson, of the Department of Agriculture, has established four agricultural experiment stations in Alaska, at Sitka, Kenai, on Kenai Peninsula, Copper Center, 105 miles from Valdez, at the head of Prince William Sound, and Rampart on the Yukon River. At each station, land has been cleared and put under cultivation. One by one the successes or failures are noted and reported. Prof. Georgeson has recently given much of his time to planting all kinds of hardy fruit trees and to experiments in budding and grafting currants, gooseberries, raspberries, etc. The results obtained at these stations should be carefully studied by all who think of following any branch of agriculture in Alaska. The report from the station at Rampart is more encouraging than the others. Mr. Reader, the agent in charge, reported that oats, rye, and wheat had matured, and were harvested about August 15, and that in ten days more the barley would be harvested.

COMPARATIVE AGE OF THE FLORISTIC ELEMENTS OF EASTERN NORTH AMERICA.—In a paper by Dr. John W. Harshberger (*Proceedings* of the Acad. of Nat. Sci., Philadelphia, Vol. LVI, Part 3, 1904), he presents the fact that the component elements of the flora of eastern North America have had an historical development, and gives the methods of determining their relative or comparative age and reasons underlying their distribution. After enunciating the general principles to be observed in scrutinizing the flora of the country, he applies them in the determination of the age of the floristic elements in eastern North America. Dr. Harshberger says in part:

All of eastern America, north of the great terminal moraine which marks the southern boundary of the great ice-sheet, with the exception of the nunataks, has been tenanted by plants which have migrated into the territory abandoned by the great continental glacier. Geologists believe, from evidence afforded by the time that it has taken for the river to cut the gorge at Niagara, that 10,000 or 15,000 years have elapsed since the close of the glacial period. If their deductions are sound, then the flora of the northern part of eastern America cannot be older than 15,000 years at the outside. Some of its elements may be much older, and we have reason to believe that many boreal plants existed as such on the nunataks, which were unglaciated areas above the great ice-sheet.

The first wave consisted of the distinctly glacial flora, which skirted the border of the ice-sheet. The second wave, younger as a floristic element of the North, consisted of boreal plants, many of which, as bog plants, tenanted the bogs and margins of the glacial lakes that were formerly much more abundant in the North than at present. These bog and tundra types pushed early into the barren ground left by the retreating ice.

The tundra was closely followed by the coniferous forests on the western and eastern sides of the glaciated areas, and these trees constitute a third floristic element, much younger in point of the times in which they have occupied the North. These trees, and those forming a still younger element, surrounded the bog plant societies which were trapped by the surrounding tree vegetation; and as the bog was gradually transformed by biologic influences into firmer ground, gradually encroached on the bog plant associations. Present bog habitats are continuations of similar habitats which existed in early postglacial times, when tundra conditions and tundra vegetation were dominant. The fourth element just mentioned consisted of deciduous shrubs and trees—oaks, hickories, and the like—which at present are south of the great coniferous belt of forest. In the East, among the highlands, exceptional circumstances were afforded for the preservation of the northern forms.

During the glacial period, for example, Mount Washington was a nunatak tenanted by plants that have remained permanently on this mountain. The summit

flora is older than that of the lower Alpine slopes above timber-line, and the flora of these slopes is, in turn, older than that of such gorges as Tuckerman's Ravine, Huntingdon Ravine, and Great Gulf, which probably supported local glaciers for many centuries after the great ice-sheet had retreated from the Presidential Range.

CROPS IN THE SEMI-ARID REGION.—Under a somewhat sensational title, *Vast Hidden Wealth in the Semi-arid Region*, Mr. G. E. Mitchell, Secretary of the National Irrigation Association, points out, in *Forestry and Irrigation* for March, 1905, that the introduction of new drought-resisting crops and scientific methods of soil-culture are giving promise of good financial returns in portions of the United States which had been supposed to be worthless. Mr. F. V. Colville has recently pointed out that near Cheyenne, Wyoming, on a plateau 6,000 feet above sea-level, profitable crops can be grown on lands which have been regarded as suitable only for the sparse grazing of cattle and sheep. New plants brought from the semi-arid regions of Turkestan, Russia, and Siberia have been found to thrive under conditions which would cause the Mississippi Valley farm crops to die. Macaroni wheat is found to grow with 10 inches of rainfall a year and to yield 15 bushels to the acre where ordinary wheat is a failure. This macaroni wheat belt is stated by Mr. M. A. Carleton, cereal specialist of the Bureau of Plant Industry, to extend from north to south across the United States from the 98th to well beyond the 102d meridian. Other new crops which promise to be successful are kaffir corn, the sorghums, millets, and new drought-resisting varieties of oats and barleys. By improved methods of soil-culture, by sub-surface packing and continual surface cultivation, better crops can be obtained in districts of small annual rainfall than has hitherto been possible. The future is hopeful along these lines; but it must still be remembered that there is such a thing as a climatic desert, even within the borders of the United States.

R. DEC. W.

FIFTH REPORT OF THE GEOGRAPHIC BOARD OF CANADA.—This edition contains all the decisions of the Board to June 30, 1904. In a country where new geographic names are continually being introduced it is to the advantage of the Board's work that the Government of the Northwest Territories and each Province has the right to name one of its officials as a member of the Board to advise with regard to names in his part of the country. The decisions are given in alphabetical order, and also arranged by provinces and territories. Discarded names are printed in italics, with references to the names that have replaced them.

CANADA'S SECOND TRANSCONTINENTAL RAILROAD.—Vice-Consul-General George Hill writes from Halifax under date of Nov. 22, 1904, to the *Consular Reports* for January, 1905, that twenty-five separate parties of engineers were then at work on different sections of the Grand Trunk Pacific R.R., which is to cross New Brunswick *via* Edmunston, pass through Winnipeg, and reach the Pacific Ocean at Port Simpson, where it will connect with steamers for the Orient. Parliament last winter took the steps necessary to authorize the construction of this railroad, which will be 3,300 miles long.

AFRICA.

THE BRITISH ASSOCIATION MEETING IN SOUTH AFRICA.—According to a Johannesburg newspaper, two hundred or more members of the British Association are expected to visit that town when in South Africa for the autumn meeting. The Mayor of Johannesburg has estimated the consequent expenses at about £6,000. The guests are due at Johannesburg on August 28th. Sir David Gill reports that the various South African Governments have responded in a generous way to the call for

hospitality to the members—the Cape Government offering £3,000, the Transvaal and Orange River Colony £2,000, and Natal £1,000. The railways are also granting special arrangements, and, in some cases, free fares. Some five or six men of science are said to be going out ahead of the main body to study their special subjects in South Africa before the meeting.—(*Athenæum*, Feb'y 25.)

Lake Rukwa Filling Again.—*Globus* (1905, No. 5, p. 84) says that Lake Rukwa, to the east of Lake Tanganyika, has risen within the past two years so that the water-level once more fills the whole area which travellers marked out as its recent bed. A number of Europeans, who visited the lake during the nineties, reported that it had shrunken greatly, and even in the height of the rainy season it did not appear to cover more than a part of its former bed. Missionaries Dromaux and Hamberger, who with Capt. Von Wangenheim, Chief of the District of Bismarckburg, report the recent rise of the waters, say that the lake now bathes again the site of Dr. Kayser's grave, near the north end of the depression it occupies. It is now possible to travel by boat from the mission station, some ten miles south of this spot, to that on the Songwe—a distance of nearly 100 miles.

The *Geographical Journal*, commenting on this interesting news, says that the facts show that caution is needed in adopting the conclusion that a rapid and progressive desiccation of Central Africa is now taking place, many instances of fluctuation of water-level being probably due to periodic variations of rainfall. It would be of interest to obtain information regarding recent changes of level in the other great African lakes.

The Uganda Protectorate and White Settlement.—The fact that a large part of the Tropics must be developed by native labour, under the supervision of European overseers, is becoming more and more certain as the climatic conditions of one tropical possession, or "sphere of influence," after another are better known. Thus, in a recent Parliamentary paper (*Africa*, No. 12, 1904), the British Foreign Office has published a report by the Commissioner of the Uganda Protectorate, in which the following statements are made:

I do not consider that Uganda will ever be a white man's country in the sense that South Africa is, and parts of East Africa will prove to be. The climate is not conducive to European colonization, nor to European manual labor in the open. The development of the Protectorate will be by native agency under European supervision, and with the help of European capital; and it is here that the opportunities for British enterprise come in . . . The work would be done by paid native labor under the superintendence of the settler and his assistants.

R. DeC. W.

Cotton-Growing in the Sudan and in Nigeria.—The *Scottish Geographical Magazine* for January contains an abstract of a report on "Cotton-Growing in the Sudan," issued by the Sudan Government, and containing the results of experiments and investigations made during 1902–03. Cottons of various kinds and qualities have been grown in several districts with varying success. The Director of Agriculture reports that Dinka Land, an alluvial plain between the ironstone plateau and the sudd basin, comprises an area of about 14,000 square miles, at least half of which is suitable for cotton-growing. The serious difficulties at present in the way are the want of population and the heavy cost of transportation.

In a recent work, entitled "The White Man in Nigeria," the author, Mr. G. D. Hazledine, takes a rather optimistic view of the suitability of Nigeria for cotton-raising.

R. DeC. W.

The Economic Future of Africa.—Dr. Karl Dove, Professor of Geography at the University of Jena, has a very interesting paper in the *Geographische Zeitschrift* (Vol. IX, No. 1) on the development of the African continent. It has at present

less than six inhabitants to the square kilometer. Dr. Dove estimates that the area of forest and arable lands capable of supporting a large population is 14,300,000 square kilometers; about 8,500,000 square kilometers of steppe land are capable of sustenance to a much less but still important number of human beings; and about 7,000,000 square kilometers are desert and useless lands. One square kilometer of forest and arable land he estimates as capable of supporting fifty persons, at which rate Africa should be able to support at least 700,000,000 of persons, which is about 500,000,000 more than the present population. The greater part of this vast area must always be the distinctive home of the native black tribes, for it is not adapted for occupancy by the white races. Prof. Dove estimates that only about 700,000 square kilometers in the north and 2,000,000 in the south are suitable for white colonization. Though gold is abundant and there are large supplies of iron, there is no evidence as yet that coal is anywhere present in great quantity, which is an industrial disadvantage. Only plants that can be cultivated by the natives themselves are likely to be of large future importance, and cotton is probably destined to be most valuable. The marked inferiority of Africa in natural means of communication will probably be the greatest obstacle in developing it. The development of a railroad system is positively necessary, because only three good waterways lead from the ocean into the interior, these being the Nile, the Niger-Benue system, and the Zambezi, with its Shire affluent toward Lake Nyassa. Only ninety miles of the lower Congo are available, but the network of railroads and navigation that is developing on the lower and upper Congo promises great results in the development of the interior. Natural harbours are poor and few in number. The length of the existing African railroads per 10,000 square kilometers of area is very small in comparison with the other continents, and Dr. Dove estimates that about 81,000 kilometers of new railroads are needed for the most advantageous development of the country.

He gives some interesting comparisons between the cost of freightage by the present methods of transportation in Africa and the cost on the Prussian State railroads. He shows, for example, that on the Southwest African railroad from Swakopmund to Windhoek the cost per ton is three times as much as on the Prussian railroads; the cost by ox-wagon in that part of Africa is nearly twenty times as much as on the Prussian roads, and the cost of carriage by porters is forty times as much. Thus, though the freight charges on the pioneer African railroads are very high, the development of railroad systems is necessary, because the cost of other methods of transportation would be prohibitive for a large amount of freight. There can, therefore, be little development without a large addition to the railroad mileage.

Origin of the Witwatersrand Gold.—The *Transactions* of the Geological Society of South Africa (Vol. 7, Part 3) contains an essay by Dr. F. H. Hatch and Dr. G. S. Corstorphine on the petrography of the Witwatersrand conglomerates, with special reference to the origin of the gold. The original explanation was that the Rand conglomerates were ancient placer-deposits, in which the gold was as much a product of denudation as the pebbles which accompany it. The authors show that the theory of the subsequent infiltration of the gold is most in accordance with the facts. The gold is practically confined to the matrix of the conglomerate, and occurs there in crystalline particles in association with other minerals of secondary origin.

No Alcoholic Liquor for Natives.—A liquor ordinance enacted for the British Central Africa Protectorate on the last day of 1904 provides that the distilled and alcoholic liquors may be admitted only for the use of the non-native population. No person may import such liquors into the Protectorate for the purpose of sale

without a license, and a duty of 12 shillings (about $3) per proof gallon will be imposed upon all distilled liquors and one of 10 per cent. *ad valorem* upon wines, beers, and other fermented alcoholic liquors imported for sale.

Turning Mangrove Bark to Account.—The *Board of Trade Journal* (No. 432) gives a brief account of the collection and shipment in the northern part of Mozambique of red mangrove bark for use in tanneries. The industry began about three years ago. The demand for the bark is increasing, and the industry is assuming an unforeseen importance. The valuable astringent properties of this commodity are attracting attention both in Europe and America, and the bark is beginning to be largely utilized. Extensive forests of mangrove are found throughout all the bays, estuaries, and river mouths of East and West Africa, where the trees grow thickly along the tropical coasts at all points accessible to tidal influence.

ASIA.

The Negritos of Zambales.—Mr. William Allan Reed, of the Ethnological Survey of the Philippines, during 1903, made a study of the Negritos of the Zambales Province in the southern part of the island of Luzon. His report, covering 90 pages, has been printed by the Government in Manila, and has just reached this country. The book includes an excellent index and a large number of photographic reproductions, showing these Negritos in their home life, industries, dances, and other aspects. One of the photographs shows a white soldier of average stature standing by the side of a mixed blood and a pure Negrito, the contrast graphically illustrating their diminutive stature.

The Negritos of the Philippines constitute one branch of the eastern division of the pygmy race. The western division is the African. It has been recognized that the blacks of short stature may be grouped into these two large divisions. Other well-known branches of the eastern group are the Mincopies of the Andaman Islands, and perhaps also the Papuans of New Guinea, who are similar in many particulars to the Negritos of the Philippines, although authorities differ in grouping the Papuans with the Negritos.

Mr. Reed's paper is chiefly concerned with Zambales, though Negritos are found, more or less mixed with other tribes, in at least eleven other provinces of Luzon. The dwarfs whom he studied lived in the mountainous portion of the lower half of Zambales and the contiguous provinces of Tárlac and Pampanga, extending southward to the extremity of the peninsula of Bataán. There is enough fertile land to support thousands of people, but the Negritos occupy practically none of it. Their villages and mountain farms are very scattered. They build their hamlets, for the most part, on the table-land above some stream, and their little clearings are found on the slope of the ridge at the base of which the streams run. No use is made of the grass-covered table-land.

They range in stature from 4 to 5 feet, and have kinky hair, almost black skin, and are not prognathous. Individuals sometimes attain the stature of the shortest of white men, and only a slight infusion of Malayan blood is necessary to cause the Negrito to equal the Malay in height.

The custom so prevalent in parts of Africa of sharpening the upper teeth prevails throughout the Negrito territory. The clothing of the male consists simply of a breechcloth and an occasional cast-off shirt obtained from some Filipino. A strip of cloth fastened around the waist and extending to the knees serves a woman for a dress.

The general condition of these natives, although not one of extreme misery, is

indeed pitiable. Their life is a continuous struggle for sufficient food, but their efforts to provide for themselves stop short at that; clothing and houses are of secondary importance. A shelter sufficient to turn the beating rains is all the Negrito asks. The most common hut consists simply of two-forked sticks driven into the ground, about four feet high and eight feet apart. A horizontal piece is laid in the two forks, then some strips of bamboo are inclined against this crosspiece, the other ends resting on the ground. Some cross-strips are tied to these bamboos, and the whole is covered with banana leaves. With the materials at hand, a half-hour is sufficient for one man to construct such a shelter. The more prosperous Negritos have four-posted houses of bamboo, with roof and sides of Cogon grass.

The Negrito knows little of the art of making things. His bows and arrows are fashioned with considerable skill, but his few other products are very crude and primitive.

The flint-and-steel method of fire-making has almost entirely supplanted the more primitive method by rubbing two sticks together; but in some instances this method is still followed, and everywhere the Negritos know of it. They borrowed the flint-and-steel idea from the Filipinos.

There is scarcely anything in the animal or vegetable kingdom of his environment of which the Negrito does not make use. He never has more than two meals a day, sometimes only one, and he will often start early in the morning on a deer hunt without having eaten anything, and will hunt till late in the afternoon. In addition to the fish, eels, and crayfish of the streams, the wild boar and wild chicken of the plain and woodland, he will eat iguanas and any bird he can catch, including crows, hawks, and vultures. Large pythons are especially desired, but these reptiles are very scarce. Besides rice, maize, camotes, and other cultivated vegetables there is not a wild tuber or fruit with which the Negrito stomach is not acquainted.

Chapters are given to the industrial life of the people, their amusements, a description of their social customs, and the futile attempts of the Spaniards to subject, convert, and organize the tribes. Appendices give a considerable number of anthropometrical measures, and four pages of vocabularies.

LIVE STOCK IN THE PHILIPPINES.—The fifth annual report of the Philippine Commission says that the Government is now maintaining eight experiment stations and farms in the archipelago. Among the phases of experimentation that promise to be useful is the importation of breeding animals—cattle, horses, donkeys, hogs, and fowls which have been imported from the United States and distributed among several of the stations. Some of the best types of live stock in this country have been sent to these stations, and, on the whole, the animals have done very well. The milk supply of Manila is insufficient and unsatisfactory in quality, and it is hoped to establish a dairy farm in the suburbs of the city.

CHINA'S FOREIGN TRADE IN 1903.—The Annual Report of the Customs Department of China says that the value of the foreign trade of that Empire, expressed in the currency of the country, has again surpassed all previous records, reaching the high figure of 541,091,600 haikwan taels,* almost exactly double the figures of ten years ago. These data are a little misleading, however, the fact being that the actual quantity of trade was less than in 1902. This is explained by the circumstance that the prevailing prices were higher, and on the whole the quantities of goods bought and sold were somewhat smaller. The imports were valued at 326,739,133 haikwan taels. China paid 8,390,000 haikwan taels for 58,478 piculs† of

* The average value of the haikwan tael in 1903 was 61.3 cents.
† A picul equals about 133⅓ pounds avoirdupois.

opium, the price of this article of self-indulgence having increased to 750 haikwan taels a picul. Cotton manufactures, rice, kerosene, machinery, and coal were other important imports. The value of the exports was 214,352,467 haikwan taels. China's chief asset for meeting her international obligations is silk and its products, but in 1903 they constituted no more than 35 per cent. of the total exports. Tea showed larger increase than any of the other export products. Tonnage increased by 3,300,-000 tons, the total being 57,290,389, of which Great Britain contributed 49 per cent., China 17, Japan 14, Germany 13, Norway and France each 2, and America and Russia each 1.

THE TEN CHIEF PORTS OF CHINA IN 1903.—The ports of China arranged in the order of the value of the importations and exportations tributary to them in 1903 is as follows: Shanghai, 285,443,000 haikwan taels; Canton, 68,205,000; Kaulun, 34,282,000; Tientsin, 21,703,000; Swatau, 18,895,000; Newchwang, 16,033,000; Amoy, 14,532,000; Chefu, 13,039,000; Hankow, 12,517,000; Fuchau, 11,345,000.

A VOCABULARY OF THE DIALECT OF BOKHARA.—In the second Danish–Pamir Expedition, conducted by Lieut. O. Olufsen, of the Danish Army, he improved the opportunity to make himself familiar with the language spoken in the regions he traversed. Most of the persons in his caravan were Sarts from Russian Turkestan, and one of his most trusted agents was Mirza Abdul-Khader Beg, from the town of Bokhara, who accompanied him by order of the Emir. This man, who was his most intimate associate, belongs to the most cultivated class of the Usbeg population of Central Asia. Lieut. Olufsen says that the Persian (Iranian) and Turkish nations of Bokhara and Turkestan are so intermingled that both in the larger and smaller towns they are seen living next door to one another. It is not rare that two merchants, neighbours in the bazaar of Bokhara, cannot understand one another, the one being a Tajik and speaking a Persian dialect, the other an Usbeg, speaking Turkish. The educated classes often speak both languages.

The vocabulary collected by the explorer covers 56 pages, and is chiefly derived from Mirza Abdul-Khader Beg and some of the words from his caravan people living in Osh, Turkestan. The equivalents of the words are given in English, and the vocabulary represents the language spoken in Bokhara and its environs. It is substantially identical with the Turkish language as spoken in Russian Turkestan by the so-called Sarts, a Turk from Bokhara conversing as easily with a Sart from Tashkent, Kokand, or Osh, as with one of his fellow-townsmen.

THE CLIMATE OF TIBET.—Before the Royal Geographical Society, on February 13 last, Sir Frank Younghusband gave an account of the geographical results of the Tibet Mission. The passage into Tibet, by the Tang-la Pass, 15,200 feet above sea-level, was attended with great suffering, on account of the low temperature (−18°) and the rarity of the air. The march over the elevated plateau, in the teeth of bitter winds and blizzards, was very difficult. These harsh conditions continued through January, February, and March. On arrival at Gyantse, April 11, the piercing cold was left behind; willows and poplars were bursting into foliage, and the river banks were covered with iris plants. Heavy rains fell on July 14, and frequent rain was noted until September, the size of the rivers showing that this part of Tibet receives a considerable rainfall, probably up the Brahmaputra Valley.—(*Nature*, February 16, 1905.)

R. DEC. W.

THE BAGDAD RAILROAD.—The first section of the railroad that will connect Europe with Bagdad was opened on October 25 last, the birthday of the Sultan. It begins at Konia, in southwestern Anatolia, the terminus of the present line from

Constantinople, and extends eastward through Eregli to Bulghurlu. The rolling stock and railroad material were supplied by German and French manufacturers, and the Anatolia Railroad Company (German) is operating the section.

Wireless Telegraphy.—Experiments have been made with wireless telegraphy between Diamond Island and the Andamans with the most satisfactory results. The *Pioneer Mail* says that a message recently transmitted from Port Blair, in the southern part of the Andamans, reached Calcutta in nineteen minutes, though it had to be transferred to the land-lines after reaching Diamond Island. The nearest point of the peninsula from Port Blair is 750 miles distant.

AUSTRALIA.

Cotton-Growing Possibilities in the Tropical Section of Australia.—At a meeting of the Victorian Branch of the Royal Geographical Society of Australasia in Melbourne (*Victorian Geog. Jour.*, Vol. XXII, 1904) a paper was read by Dr. Thomatis, an Italian resident of Queensland, who has successfully experimented in the hybridization of different species of cotton. He has evolved a marketable type, which he has named *caravonica*. It is asserted that this cotton thrives in a moist, tropical country like Queensland, and promises to be very productive. The *Financier* of London says there is a fair prospect that the cultivation of this cotton will be undertaken on a large scale, not only in Queensland but through the whole tropical territory in the Commonwealth north of 18° S. Lat. The sole difficulty in the way is the restriction imposed on the immigration of coloured labour. It is said that, at the low rate of one-third of a bale to the acre, a total of 20,000,000 bales of the fibre may be produced in a year (!).

EUROPE.

The Widening of Vienna.—On Dec. 28 last the city limits of Vienna were extended on the east by taking into the municipality an area on the left side of the Danube about half as large as the city and including a number of towns. With the exception of a very small territory the city has hitherto been confined to the right bank of the river. The added territory will form the twenty-first district of Vienna, with the name Floridsdorf. It includes 9,314 hectares, which will increase the area of the city to 27,126 hectares. This makes Vienna now the largest city of continental Europe, and it is surpassed only by Greater London, with its area of 30,218 hectares. The result of the union is not so important in its addition to the population of the city, as it adds only 61,536 persons. The city in its new extent had, on Dec. 31, a total population of 1,878,339, being still surpassed by London, Paris, and Berlin in number of inhabitants. The *Deutsche Rundschau für Geog. u. Stat.* (Vol. 27, No. 6), from which these facts are taken, has a map of the city in its new extent on a scale of 1:75,000, or 1.18 statute miles to an inch.

The Simplon Tunnel.—The north and south galleries of the Simplon Tunnel between Switzerland and Italy were joined on Feb. 24. The two galleries met in the middle of the Alps, at a point 6 miles and 791 yards from the north entrance. The length of the tunnel is 19,803 metres, or about 12.26 miles, and it is the longest in the world. The length of the Arlberg Tunnel is 6.36 miles; Mont Cénis, 7.98; St. Gothard, 9.3 miles; Severn, 4.35 miles, so that the Simplon exceeds the next longest by nearly three miles. The great difficulty of piercing this tunnel was not its length but the soft and, consequently, treacherous rocks found in places, combined with hot and cold springs of great volume, the former being of high temperature. The work

now remaining is to put into place the masonry arching to cover over the water channel beneath the floor of the tunnel and to lay the permanent way, after which the formal inauguration will doubtless take place, with general rejoicings upon the completion of the most remarkable work of its kind in the world.

AUTUMN RAINFALL AND THE YIELD OF WHEAT IN ENGLAND.—In the London *Times*, Feb. 7, 1905, Dr. W. N. Shaw, F.R.S., called attention to a relation between the autumn rainfall and the subsequent yield of wheat which is remarkable. "Autumn" is a season of thirteen weeks, covering approximately the months of September, October, and November, and the figures for the yield of wheat express in bushels per acre the average yield for England as given in the returns of the Board of Agriculture. With certain exceptions it is seen that "every inch of autumn rainfall involves a diminution of the yield of wheat for the following year by a bushel and a quarter per acre." Seven years out of the 21 considered give an agreement within a half bushel, when the yield is computed from the autumn rainfall by subtracting from the datum of 39.5 bushels per acre one and a quarter bushels for every inch of autumn rainfall. Among the reasons given for the influence of the autumn rainfall upon the wheat yield are the washing of nitrates from the soil, and the postponement of sowing to the spring because of the moisture; but, still, the close relation remains a very remarkable fact. The study is based on averages over large areas, and the conclusions might have to be modified if separate districts were considered. Dr. Shaw read a paper on this subject before the Royal Society on Feb. 2, 1905 (*Nature*, Mar. 16), and the *Times*' letter is reprinted in *Symons' Meteorological Magazine* for February.

R. DE C. W.

ENGLISH FOGS AND COMMERCE.—All are more or less familiar with the geographic fact that England, and the English cities, have dense fogs. But few realize their commercial significance. U. S. Consul Mahin, stationed at Nottingham, gives us a number of interesting items, some new and some familiar to students, concerning such phenomena. The fog becomes most dense after sundown, often gradually melting away toward midday, but occasionally continuing all day. A very thick fog rarely lasts more than two or three days. The first ones come with the autumn frosts, corresponding in time and atmospheric conditions with our Indian summer. The air is very still and the temperature relatively low. Densest fogs are usually in November, but the maximum number of foggy days is in December, then November, January, and October. The average annual number of such days in London is 55—45 from October to March. Clearest months are May–July. Least stormy years are freest; cold and quiet years have most.

It is stated by many authorities that the fog is much aided in formation, as well as intensified, by the presence of dust particles, as those of smoke. Coincident with this comes the statement that the fogs are thinnest and rarest in the months when coal is burned least. It has been pointed out that they increased as the use of coal grew, and that during the last fifteen or twenty years they have become less dense, owing to the more extensive use of electricity and to systematic attempts to abate the smoke nuisance. Hence it appears that they are related to the great industrial development of the cities, and belong more especially to the purely coal-using stage in that evolution.

They seriously interrupt business of all kinds—delay passengers, increase risk, increase help needed, and expense of precautionary measures. Extra labour is employed, and even the pay of engineers and firemen is increased during fog days. Detention of goods and delay in delivery cause loss which often falls on the railroad companies. The moisture damages store goods and furniture, furs and textiles. The

death-rate increases and throat and lung troubles are aggravated. The author mentions some discussions and suggestions of means to disperse or partially dissipate fog. —(*Consular Report* for February, 1905, p. 10.) G. D. H.

Dockyard at Devonport.—Rapid recent development and contemplated immediate improvements of this river-mouth harbour of southwestern England not only make Devonport the first naval port of the Kingdom, but will put her in possession of one of the largest docks and dock basins in the world. A sea-wall now stretching from the southern end of the yard will be extended; abundant facilities for coaling all kinds of vessels, and dredging, to increase the depth to a 30-feet high-tide level, are already under way. A mammoth electric power plant at Keyham will furnish power and light for the entire governmental and other establishments.—(*Consular Report*, February, 1905, p. 66.) G. D. H.

The Vertical Gradient of Rainfall at Ben Nevis and the Puy-de-Dôme.—At the meeting of the Scottish Meteorological Society, held in Edinburgh, December 6, 1904, Mr. A. Watt discussed the question of the vertical gradient of rainfall. The 19 years' series of rainfall records from the Ben Nevis Observatories showed, somewhat unexpectedly, that the ratio of the amount of rainfall at the top of the mountain to that at the foot exhibited very little variation from month to month. On the other hand, comparing the rainfall on the Puy-de-Dôme with that at its base station, Clermont, for an 18 years' period, there is a radically different curve, the two sets of monthly ratios being as follows:

	J.	F.	M.	A.	M.	JU.	JY.	A.	S.	O.	N.	D.
Ben Nevis, Fort William.........	1.9	1.9	2.3	2.2	2.3	2.2	2.3	2.2.	2.1	2.0	2.0	1.9
Puy-de-Dôme, Clermont.........	5.5	4.5	4.2	2.8	1.8	1.6	1.7	1.8.	1.8	2.3	2.9	4.6

The two Scottish stations had much heavier rainfalls than the two French ones, and only the general character and not the amplitude of the two curves was in consideration, especially since differences of height might affect the problem. The differences of the curves may be accounted for on the following suppositions: (1) That the greater part of the Ben Nevis rainfall is of cyclonic origin, since there does not seem to be any theoretical reason why the gradient of rainfall of purely cyclonic origin in a mountainous district should have a seasonal variation; (2) That a great part of the Central France rainfall is of local convectional origin. The zone of maximum rainfall of such origin varies greatly in height with the seasons, as explained by Hann and others, and would certainly be far above the level of the Puy-de-Dôme in summer, and probably below that level in winter. But all rainfall problems are complex, especially those dealing with high levels, since the mass of a mountain has a double influence, in deflecting winds upwards, and in causing or strengthening local convectional currents in warm weather. R. DeC. W.

Glacial Feature in the Surface of the Alps.—Under this title Prof. Albrecht Penck, of the University of Vienna, has published (*Journ. Geol.*, 1905, Vol. XIII, pp. 1–19) an exceedingly scholarly statement of the extreme view of glacial erosion, of which he is one of the most distinguished advocates. He points out that in numerous ways the Alpine valleys differ from normal stream valleys. Instead of a regular curve the upper valleys descend by steps, and lower down there is often a reversed slope, holding a lake. These are features which streams destroy, instead of produce. The mouths of the tributaries are usually not accordant with the main valleys, but are at a higher level, forming hanging valleys, at the ends of which there are gorges and often strikingly-developed waterfalls. On each side of

the main valley walls are commonly found well-marked ledges or shoulders separating two quite different slopes, a more gentle one above and a steeper slope below, bounding a trough-like lower valley. The appearance is that of a newer valley, excavated in the bottom of an older one, whose level is indicated by the shoulder and by the elevation of the hanging tributary valleys.

That the features are not due to subsidence is indicated, in the case of the lake valleys. by the fact that the lake water does not enter into the side valleys, proving digitation, but, on the contrary, the side-valley bottoms are above lake-level. The valley-forms are so unlike those of normal streams that Penck considers it impossible that they can be river-formed. This conclusion is based upon the fact that the valleys have the width of mature valleys, but bottom slopes, steep sides, and discordant tributaries, which are wholly out of harmony with maturity of valley-form.

That these features are the result of ice erosion is the main thesis of the paper, and the case for ice erosion is very clearly and forcibly stated. Beginning with the elimination of other explanations, Penck then points out that the conditions above outlined are found only within the region visited by ice of the Great Ice Age. He then considers the question of how ice erodes, and why it erodes faster in some places than in others, and follows this with a consideration of specific instances of ice-eroded valleys and passes.

Altogether this is the most masterful discussion of ice erosion in the English language that has come under notice of the reviewer; but it is only an abstract of a much more detailed discussion by Penck and Brückner, under the title of *Die Alpen im Eiszeitalter* (Leipzig). The extent to which ice erosion is appealed to as a factor in modifying topography is startling, exceeding as it does even the claims of ice erosionists in the days of Ramsay. The following quotations will suffice to show how far Penck goes in the application of ice erosion to the shaping of topography in glaciated regions:

> The increase of destruction above the glacial snow-line is not due to an increase of weathering above it, but is caused by the development of a new agency, degrading land at a faster rate than the running water. This agency is the glacier ice.

On the next page (19) Penck says:

> The actual surface features of the Alps do not at all correspond to those of a water-worn mountain range. Their conformation is mostly due to ice-action, which becomes most visible where the old glaciation ceased.

For the present, at least, it is doubtful if many students of physiography will go quite as far as this; and it should be stated that there is still a large body of students of glacial action who deny to ice even a small share in shaping topography.

R. S. T.

SURVEY OF ICELAND.—According to *Petermanns Mitteilungen*, the Danish Government began the survey of Iceland as soon as that of the Faroes was completed. Much of Iceland has never been accurately surveyed, triangulation having been carried out in only a few parts of the island. The least-known region is the southern coast, which is impassable in summer owing to the quicksands; and also the inland ice-masses of the Vatna Jökull, and it is here that a beginning has been made with the survey. During the summer of 1903 a plan of the survey was laid down by means of a preliminary expedition; and in the spring of 1904, so long as the frosts made it possible to cross the morasses and streams, a part of the southern region in the district of Skeideraasande was surveyed. A second survey party was detailed to study the inland ice. One result of the work was to show that the highest point of the island is Hvannadalshnukr, which is 2,120 metres, and not, as has been hitherto

supposed, the Oraefa Jökull, which is only 1,959 metres. In all about 100 Danish square miles—that is, 5,700 kilometers—have been already surveyed.—(*Scot. Geog. Mag.*, March, 1905.)

POLAR.

THE ZIEGLER ARCTIC EXPEDITIONS.—In January of this year Mr. William Ziegler purchased from the British Government the whaler *Terra Nova*, for the purpose of heading a Relief Expedition to Franz Josef Land in search of members of the Ziegler Polar Expedition, who left Norway July, 1903, on board the S.S. *America.*

The *Terra Nova* will be commanded by William S. Champ, who has selected for his captain Captain J. Kjeldsen, with a Norwegian crew. A small party will accompany Mr. Champ, comprised of medical men, in all a party of probably four or five members. This expedition will be thoroughly equipped to over-winter, if necessary, arrangements having been made to take on dogs for field work.

In addition to the voyage of the *Terra Nova* the S.S. *Belgica* has been chartered for the purpose of visiting Shannon Island and Bass Rock on the east coast of Greenland, between 75 and 76 degrees of latitude, where relief depots were laid down in 1901. The object of this voyage is to ascertain if, by any chance, any of the members of the previous expedition have returned by the way of the east coast of Greenland.

This expedition will leave Norway on the 15th of May, and the personal representative of the expedition will be Dr. Oliver L. Fassig, who has been nominated for this purpose by the National Geographic Society of Washington.

The *Terra Nova* is being thoroughly overhauled, and will be commissioned and ready for sea the first week of May, sailing from London to Cardiff for coals and then direct to Tromsoe, Norway, where additional equipments will be taken aboard and the start direct for Franz Josef Land will be made about the last week in May or first of June.

THE CHARCOT ANTARCTIC EXPEDITION SAFE.—After the anxiety created by the failure of an Argentine vessel to find any traces of the French Antarctic Expedition in a region which it expected to visit, it is gratifying to receive news from Mr. Jean Charcot, the explorer in command, announcing that his party is well and has made valuable discoveries. In a letter written at Puerto Madrin, on the coast of Patagonia, and dated March 4, the explorer says that scientific work was carried on under excellent conditions while wintering on Wandel (?) Island. Several parts of Grahamland, hitherto unknown, were explored by the expedition, and its outline was determined by following its coast.

FATE OF BARON TOLL.—According to a Reuter dispatch from St. Petersburg, dated March 9, the North Polar Commission has officially declared that the expedition under Baron Toll to the new Siberian Islands, in the Arctic Ocean, has ended with the death of all the members of the party. The party sent in search of the expedition found in Bennett Island a letter written by Baron Toll, saying that the members of the expedition had continued on their journey though having only 18 or 20 days' provisions left. It is, therefore, believed that Baron Toll and his companions perished of hunger.

THE SOUTH POLAR TIMES.—During the Antarctic winter of 1902 and 1903 the officers of the British National Antarctic Expedition on board the *Discovery*, among the other diversions for lightening the long and dreary darkness, brought out at monthly intervals a paper, to which they gave the name of *The South Polar Times.* Specimen pages have been sent to this Society; and it is not too much to say that in

literary quality, in variety, and especially in artistic features, no enterprise of the sort (for earlier polar expeditions have made similar ventures) has equalled this publication. Its letterpress, which was typewritten, ranges over a wide field, grave and gay, scientific and humorous, prose and poetry; and includes many contributions, not only by the officers and scientific staff, but also by the men. Among the contents are a diary of the events of each month, a record of the proceedings of the local debating society, stories, humorous notes, and articles of a more solid nature.

Its most striking feature, however, is the numerous artistic pictures, both in colour and in black-and-white. They include coloured sketches of the animal life, and many bits hitting off the sledging, the sports, and other incidents of the sojourn of the Expedition. It is intended to reproduce the eight volumes of this unique production in facsimile, if sufficient subscribers are obtained for the work to cover the expense. The publication will have about 400 quarto pages, and the price has been fixed at five guineas. Subscriptions may be sent to "The Secretary, *South Polar Times*, 1, Savile Row, London, W."

VARIOUS.

Drift of a Bottle in the Atlantic.—A bottle thrown overboard in Lat. 29° 30′ N., Long. 68° 10′ W., by Col. Swalm, U. S. Consul at Southampton, England, in May, 1903, has just been found on the Donegal coast, Ireland, near Arranmore. The bottle had apparently been carried by the Gulf Stream and drift along the North American coast, then across the Atlantic to the Irish coast. To travel this distance it had taken 662 days, at an approximate speed of 5 miles a day.

Germany's Colonies.—The British Foreign Office *Report* on the German Colonies for 1902–3 calls attention to the Imperial Chancellor's memorandum, December, 1903, which says that the colonies are advancing too slowly, though their progress is unmistakable. The labour problem has been serious in Samoa, as well as in German East Africa and the Cameroons, though the situation has been relieved in Samoa by the importation of Chinese coolies. The war with the natives in German Southwest Africa bids fair to cost the Imperial treasury at least $12,500,000, and the situation there causes much anxiety. The white population in German South-West Africa on January 1, 1903, was 4,682—an increase of only 8 in a year. The railroad between Swakopmund and Windhoek was operated during the year at a loss of $112,000. The track and railroad have since been badly damaged by the hostile natives, and $150,000 have been voted for repairs.

The total imports and exports of the German colonies in the fiscal year 1902–3 amounted to $15,700,000—an increase of $1,720,000 as compared with the previous year. The imports in four years have risen only 30 per cent., while the exports have increased 55 per cent. Since Kiao-chau was occupied by the Germans it has cost the treasury $3,060,000 a year, or as much as all the other German colonies together; but, by way of compensation, its advance has been most remarkable. The trade of Kiao-chau in 1902–3 was double that of the previous year; and to the German occupation are due the excellent inner harbour, the large quarter filled with European villas and two Chinese towns.

Great Canals of the World.—Information concerning the great ship canals and other canal systems of the world can be found in the Monthly Summary of Commerce and Finance for January, 1905. This publication is prepared by the Bureau of Statistics, Department of Commerce and Labor, Washington, D. C., and can be obtained as a separate.

Among the great canals the oldest, the Suez Canal, dating from 1869, and the

double canal, the United States and Canadian, connecting Lakes Superior and Huron, may be mentioned. The American canal is used by more ships annually than the Suez, and the volume of trade is far greater. Other canals discussed are the Cronstadt and St. Petersburg, the Corinth, the Manchester, the Kaiser Wilhelm, the Elbe and Trave, the Chicago Sanitary Canal, and many minor waterways designed to overcome geographic obstacles or take advantage of geographic aids. Projected canals in Prussia and Canada are discussed. The value and future of China's canals, and the history, construction, and probable influence on international commerce of the American Isthmian canal form instructive sections. The section of the paper devoted to the economic effects of ship-canals treats of their significance in commerce, industry, business methods, and the producing and marketing of commodities. In this study canals are classified as single-port canals, such as the Manchester and Amsterdam waterways; minor connecting canals, as the Corinth, Kiel, and Welland; and major connecting canals, as the Suez, St. Mary's Falls, and the Isthmian. The author shows that the port canals have a marked developmental influence on the commerce of the cities which they serve; that the minor canals do not cause very great changes in the commerce of places connected, although they do divert some trade from former routes; and that the major canals are of enormous consequence, not only in diverting trade from old routes but in developing new trade.

Special discussion of the Suez Canal shows its influence in the commerce of rice, wheat, and petroleum, in the total commerce carried on in the Mediterranean, and in the change from sailing to steam vessels in Oriental trade. The discussion of the "Soo" (Sault Sainte Marie) Canals shows their relation to the enormous development of the Lake trade, to the iron industry, to the rise of the Lake Superior iron mines and decline of the Pennsylvania output, and to the production of wheat in the Northwest, as well as several effects on prices of various commodities. The discussion of the Isthmian Canal is largely prophetic, and mentions many industrial and commercial changes which may be expected.

The article continues with a special treatment of the canals and canalized rivers of a number of the European countries, and closes with summaries of the traffic of six of the leading canal systems of the world, including those of New York State.

G. D. H.

SUBTERRANEAN TEMPERATURE.—The Carnegie Institution has recently granted to Dr. G. K. Gilbert the sum of $1,000 for preliminary work in preparing plans for an investigation of subterranean temperatures by means of a deep boring. In the Year Book of the Carnegie Institution (Nov. 3, 1904, pp. 259–267), Dr. Gilbert has made his preliminary report, and has recommended the appropriation of $65,000 for this work. Hitherto our knowledge of earth temperature has been derived mainly from mines and well borings, in both of which conditions are such as to lead to the introduction of influences which must modify the normal temperature gradient. By Dr. Gilbert's proposition a site in the granite area of the Lithonia District of Georgia is selected, in which there seems to be a probability of very uniform and normal conditions. Here the rock, which is granite, promises to be uniform in character, continuous, massive, and impervious. The region selected is one of low relief, which has not received heavy deposit during later geologic periods, and which has not suffered recent geological changes, such as glaciation, vulcanism, or rock disturbance, liable to modify the normal gradient of underground temperature. Altogether the site is favourable for the investigation, which promises to give information of high value to students of earth science; and it is an investigation which, without

the aid of some such fund as that of the Carnegie Institution, could not, in all probability, be undertaken because of the expense involved and the absence of possibility of financial return. R. S. T.

Mineral Matter in the Sea.—In a recent number of the Scottish Geographical Magazine (Vol. XXI, No. 3, March 1905, pp. 132, 136), Prof. R. D. Salisbury presents some interesting figures on the amount of mineral matter in the sea. Assuming the average depth of the sea to be 12,456 feet, the amount of mineral matter dissolved in the ocean water would, if precipitated, cover the entire ocean floor to a depth of about 175 feet. It would make a layer of from 414 to 450 feet over all the lands, or 125 feet over the entire surface of the earth. The mineral matter in solution in the ocean water is equal to nearly one-fifth the bulk of all the lands above sea level; it is equal to all of North America, Europe, Australia, and most of the islands of the world, or, in other words, to all the land above sea-level except Asia, Africa, South America, Antarctica, and Greenland.

If deposited near the margins of the continents this mineral matter would fill the ocean from the borders of the lands out to a depth of about 4,000 feet—that is, over an area of at least 19,000,000 square miles. There would thus be added to the lands an area equal to one-third of the existing lands, or an area equal to that of North America, South America, Europe, and the East Indies combined.

These figures, while showing the enormous amount of matter in solution, do not do more than give a hint as to the real importance of the solvent work of water, for it is, of course, true that the mineral matter is now and for ages has been extracted from the sea-water for deposit in rock beds on the sea-floor. Salisbury makes the statement that the amount thus extracted has far exceeded all that remains in solution. He reaches this conclusion by two distinct lines of argument. In the first place, most of the limestone, the gypsum, the salt, and probably much of the cementing materials of sedimentary rocks, have been derived by extraction from solution in sea-water.

There are no exact figures as to the average thickness of such rocks even on the land; but it is certainly several hundred feet, and Dana has estimated it at 1,000 feet for the lands. It probably far exceeds 450 feet, the average depth to which the mineral matter now in solution in the sea would cover the lands. It is true, furthermore, that the soluble substances have been re-dissolved, re-extracted, and re-deposited, in some instances repeatedly.

The same conclusion of former great deposits is reached by Salisbury in a second way. River-water contains about twenty times as much calcium carbonate as salt, but sea-water has only about $\frac{1}{227}$ as much. This indicates that enormous quantities of calcium have been extracted. The same conclusion is reached by comparing other substances, such as magnesium carbonate, silica, etc., in river and sea water.

The bearing of these facts on an interpretation of geological processes is important and significant. The growth of deltas, the movements of sand along the coast, and the filling of bays and harbours are familiar facts, because they can be seen; but this invisible work of running water, and these enormous supplies of mineral matter in solution, and their importance in interpretation of past changes, are not so universally understood and appreciated. R. S. T.

In Honour of Dr. Andree.—The issue of *Globus*, No. 7, 1905, is dedicated to Prof. Dr. Richard Andree in honour of his seventieth birthday, which occurred on Feb. 26 last. The literary activity of Dr. Andree has extended over forty-five years, during which his contributions to geographic science have been very numerous. In 1881 appeared "Richard Andrees Allgemeiner Handatlas," which first supplied to

Germany a thoroughly good and cheap atlas. Hundreds of thousand of copies have been sold.

THE GERMAN GEOGRAPHICAL CONGRESS.—The fifteenth German Geographentag will be held at Danzig on June 13–15. Among the subjects of papers and discussions will be south polar exploration, vulcanology, coast morphology, and formations of dunes and school geography.

LONG-RANGE WEATHER FORECASTS.—There has always been a fascination about long-range forecasts of weather, and the investigations which have been made along various lines in this connection run well into the hundreds. From very early times, doubtless, there have been predictions of coming weather by seasons, the behaviour, or the condition of the fur or other covering of animals being taken as an indication of severe or mild winters. Predictions of this sort find their way into our papers every year, one of the most common of these being based upon the quantity of nuts stored up by squirrels. Obviously, the behaviour of animals depends upon their physical condition, and the quantity of nuts laid away depends somewhat upon the abundance of the nut crop, and all these things are related to *past* weather, not to the *future*. Many so-called weather prophets have evolved elaborate systems of predictions based upon astronomical conditions, real or hypothetical; but where these conditions have been thoroughly investigated the whole fabric has fallen to pieces, either because the astronomical or physical facts were not sound or because the predictions were too general to be possible of verification. Studies of the relation of weather phenomena and the sun spot periods have been numerous, but have given somewhat contradictory results. Supposed lunar influences have always held attention, and many investigations along this line have thus far failed to bring us to any general, definite results which could be of any value in forecasting. Therefore, thus far, the best that can be done, in a practical way, as regards regular weather forecasts, is limited to predictions for a day or two, and occasionally three or four days, in advance. Nevertheless, weather "prophets" still flourish in different parts of the world, and even sell their misleading predictions at a good price. In order to counteract, in some way, the influence of these "quacks," the Weather Bureau has issued a *Bulletin* (No. 35, 1904) on *Long-Range Weather Forecasts*, in which the general subject of reliable and unreliable weather predictions is discussed.

R. DEC. W.

OBITUARY.—M. Charles Gauthiot, the founder of the Société de Géographie Commerciale, of Paris, and its Perpetual Secretary, died on the 27th of February last of a painful malady, endured for many years with serene stoicism.

A man of indefatigable energy and activity, M. Gauthiot possessed gifts of character and intellect which made a lasting impression upon every one brought within the range of his influence, and his death is felt as a personal loss in many countries.

NEW MAPS.

AFRICA.

ABYSSINIA.—Sketch map showing the routes of W. N. McMillan's expedition, 1904. By B. H. Jessen. Scale, 1:1,000,000, or 15.78 statute miles to an inch. *Geog. Jour.*, Feb., 1905, London.

The route crossed, from north to south, the upper portions of the rivers which form the Sobat. This region is in southwestern Abyssinia. The journey extended about 140 miles from N. to S., the southern 90 miles being practically unexplored. The map contains considerable new data relating to the upper part of the Sobat basin. Hill features along the route are indicated, and the scale permits many notes on the floral and hydrographic aspects of the country. The map is from a prismatic compass survey, and is adjusted to the longitude of Taufikia, on the White Nile.

GERMAN EAST AFRICA.—Karte von Deutsch-Ostafrika (Sheet F 4 Gawiro). By M. Moisel. Scale, 1:300,000, or 4.73 statute miles to an inch. *Mitt. aus den deutsch. Schutzgeb.* Vol. 18, No. 1, 1905. Berlin.

The 21st sheet of this official map to appear. The whole map will contain 29 sheets, and 4 of the 8 yet to be published are now being prepared. The sheet covers the part of German East Africa between 8° 30′–10° S. Lat. and 34°–36° E. Long., lying to the N.E. and E. of Lake Nyassa. It is an excellent specimen of cartography, based upon a large amount of original material. It illustrates the remarkable progress the Germans are making in the more minute study of this part of Africa. Seven years ago the only information upon which a map of this region could have been based was the route maps of Joseph Thomson (1879), Steward (1880), Giraud (1883), Johnston (1889), Wissmann, and Dr. Bumiller (1893). Their reports and maps were very important as the first information concerning a new region, but, on account of an unavoidable roughness of execution and paucity of details, they were not of the highest value, and their interest is now chiefly historical.

Seven years later the present map is the result of 63 surveys large and small, and a series of sketches of plans, the work of 29 travellers. The 63 surveys include about 650 sheets of mother maps on scales of a half mile to a little over a mile to an inch. All the surveys were made by officers in the German East African service, and the work has been done without expense to the State, excepting for the necessary instruments. The present sheet is based upon the exact determination of the geographic co-ordinates of 137 different points, and it gives a clear idea of the orographic and hydrographic conditions in this comparatively elevated region. Scattered through it are considerable areas that are not yet studied in detail; but, on the whole, this portion of German East Africa is now one of the best-mapped parts of the tropical area. This sheet will be all the more serviceable because the region it represents, together with that shown in sheet "Iringa" adjoining it to the N. (already published), is believed to present special advantages for white colonization.

UGANDA.—Ripon Falls. Scale, 1:6,000, or 500 feet to an inch. Survey Department, Cairo, 1904.

A plan of the outlet of Victoria Nyanza. A broad channel leads out of the lake for about 1,000 feet, where it suddenly narrows between two promontories, and the water pours over Ripon Falls in three channels, which are parted from one another

by rocky ridges. There the Nile begins. The main volume of water passes over the falls by the western opening. The actual drop over Ripon Falls is five metres (about 18.3 feet). Illustrates Sir William Garstin's *Report* upon the Basin of the Upper Nile.

UGANDA.—Sketch map of part of Unyoro. From a route-traverse by Capt. R. C. R. Owen. Scale, 1:500,000, or 7.9 statute miles to an inch. *Geog. Jour.*, March, 1905.

The routes of Capt. Owen extended through the region between the Albert Nyanza on the west and the Victoria Nile on the east and north. Distances were measured by pacing and the route-traverse was carried out with prismatic compass. A mass of *sudd* is shown at the entrance of the Victoria Nile into the Albert Nyanza.

AMERICA.

UNITED STATES.—Geologic Atlas of the United States.

No. 118. Greeneville Folio. Tennessee–North Carolina. Area, 963 square miles. Between parallels 36°–36° 30′ N. Lat. and meridians 82° 30′–83° W. Long. Two of the chief divisions of the Appalachian Province are represented in this quadrangle. The Appalachian Mountains occupy about 100 square miles in the south-east part of it, and the remainder lies in the Great Valley. Tributaries of the Tennessee River drain the region. Scale, 1:125,000, or 1.9 statute miles to an inch. Contour interval, 100 feet.

No. 117. Casselton–Fargo Folio. North Dakota–Minnesota. Area, about 1,640 square miles. Between parallels 46° 30′–47° N. Lat. and meridians 96° 30′–97° 30′ W. Long. Fargo (population, about 10,000), the largest city of North Dakota and the centre of trade for the Red River Valley, is in the eastern part of the area. This region shows a typical section across the valley of the Red River, including a small extent of prairie upland on the west. It also includes the eastern margin of the Cretaceous artesian basin, where the water-bearing formations rise to within 200–300 feet of the surface, and are most easily studied through the deep wells. Within this area also are found the water horizons, yielding only tubular or dug wells, that are the only source of water supply over a large part of eastern North Dakota and western Minnesota. The entire region is so flat that, even with a contour interval of only 20 feet, few contours appear except along the uplands of the west and south.

UNITED STATES.—Map of Washington showing Mean Total Precipitation. By Henry Landes. Scale, 47 statute miles to an inch. U. S. Geological Survey, Washington, 1905.

Illustrates a preliminary report on the underground waters of Washington (Water-Supply and Irrigation Paper, No. 111). Isohyetal curves show the amount of annual precipitation in all parts of the State, and the contrasts between one part and another may be seen at a glance. The rate of precipitation steadily declines from the extreme west, where the curves show annual rainfall of from 100 to 85 inches, to about the 120th meridian, where it ranges from 10 to 15 inches, and then increases to 20–25 inches in the eastern tier of counties.

UNITED STATES.—Forest Density and Land Classification, Northern New Hampshire. Scale, 5½ statute miles to an inch. Bureau of Forestry, Bulletin No. 55, U. S. Department of Agriculture, Washington, 1905.

Illustrates a monograph by Alfred K. Chittenden on Forest Conditions of Northern New Hampshire. The map includes the entire White Mountain region.

Ten tints show the estimated amount of lumber-yield per acre for the hard and soft woods, the agricultural lands (which are chiefly confined to the river valleys), the burns (small streams), and the waste and barren lands. Contours of elevation are introduced from the Government topographic sheets.

PERU.—Provincia de Cajabamba. Scale, 1:500,000, or 7.8 statute miles to an inch. *Boletín* del Cuerpo de Ingenieros de Minas del Perú, No. 19, 1905. Lima.

Shows all the mining enterprises of the province, and distinguishes the coal from the metal-producing mines.

ASIA.

DUTCH EAST INDIES.—Overzichtskaart van Java en Madoera (8 sheets). Scale, 1:500,000, or 7.8 statute miles to an inch. Topographic Bureau, Batavia, 1905. (Price, 8 guilders.)

An admirable product on a scale sufficiently large to show most information that is commonly presented cartographically. Marshes, plains, and hill regions are differentiated, wagon roads, footpaths, railroads, lighthouses, anchorages in the roadsteads, and reefs and rocks alongshore are among the kinds of information given. Heights are in metres, and place-marks indicate the political status of each town, as the capital of a residency, district, etc.

Mountains are shown in wash colours with considerable effect. Five cable lines start from the east end of Java for various points. The meridian of Batavia is used, which makes the maps less convenient for general use than might be desired.

DUTCH EAST INDIES.—Overzichtskaart van Atjeh en Onderhoorigheden (16 sheets). Scale, 1:2,000,000, or 31.56 statute miles to an inch. Topographic Bureau, Batavia, 1903.

The scale shows clearly the small areas which have been topographically surveyed, the levels being denoted by contours with 25-metre intervals. Most of the region, however, is practically white, and the information given would have been just as intelligible on a smaller scale. The special purpose of the map is to show administrative districts and their subdivisions for the use of the Government staff.

WESTERN HIMALAYAS.—Sketch map showing the route of the Bullock Workman Expedition from Srinagar to the sources of the Chogo Lungma Glacier. 1902–3. Scale, 1,750,000, or 11.83 statute miles to an inch. With inset showing the Chogo Lungma, Alchori, Hoh Lumba, and Sosbon glaciers surveyed by the Expedition, on a scale of 1:250,000, or 3.9 statute miles to an inch. *Geog. Jour.*, March, 1905, London.

These maps are from a plane-table survey by Mr. B. H. M. Hewett, corrected by Dr. and Mrs. Workman, and adjusted to the Indian Government Survey. An excellent idea is given of this complex of great glaciers and their feeding-grounds. The highest point attained, 23,394 feet, on Pyramid Peak, a little over 1,000 feet below its summit, was reached by ascending Basin Glacier, one of the feeders of Chogo Lungma.

OCEANIA.

PACIFIC OCEAN.—Insel Guam. Scale, 1:225,000, or 3.5 statute miles to an inch. *Petermann. Mitteil.*, No. 2, 1905. Justus Perthes, Gotha.

The map is based upon the U. S. Surveys, 1901–2, and has been reduced from our Hydrographic Office chart of last year. Brown tints indicate the hill features; heights and the soundings in San Luis d'Apra Harbour are indicated in metres. Native paths and drainage are shown, and the map is a good generalisation of the recent survey work.

ATLASES.

STIELER'S HAND-ATLAS.—Neue neunte Lieferungs-Ausgabe. 100 Karten in Kupferstich. Parts 41 and 42. Justus Perthes, Gotha, 1905. (Price, 60 pf. for each Part containing two map sheets.)

Especial interest in this instalment of the atlas attaches to No. 5, the North Polar Chart, and No. 6, the South Polar Chart, both by H. Habenicht. The latitudinal scale of the Arctic sheet is 1:20,000,000, or 315.6 statute miles to an inch, which is double the scale of the Antarctic sheet. Both charts, especially the North Polar, show many contrasting colours, that not only define sharply the information presented, but also increase the attractive appearance of the maps. Many changes from the sheets they supersede are, of course, observed. In both charts the routes of explorers have the colours assigned to their mother countries, and two colours are given to British routes, one showing routes before and the other during the Nineteenth Century.

The greatest changes in the North Polar chart have been produced by Peary's survey in the extreme north of Greenland, Sverdrup's discoveries west of Ellesmere Land and Grant Land, the Scandinavian surveys of parts of the coast of east Greenland, and the work of Jackson, Nansen, and the Duke of the Abruzzi in Franz Josef Land, which has completely changed the earlier ideas as to the extent and distribution of land in this archipelago.

An innovation on the South Polar chart is the distribution of seaweed, which girdles the Antarctic waters north of the 60th parallel. This beautiful chart shows very clearly the inroads that have been made in unknown Antarctica by the expeditions beginning with Larsen's cruise and that of the *Belgica*. The numerous insets in both charts on a larger scale give many details of the results of recent Polar discovery. The name West Antarktis (West Antarctica) is here first attached to the part of the continent that widens out south of Graham Land.

The other two sheets are 3 and 4 of the German Empire, on a scale of 1:1,500,000, or 23.67 statute miles to an inch. They are a revision by C. Scherrer of the late C. Vogel's well-known map of Germany in this atlas.

ATLAS UNIVERSEL DE GÉOGRAPHIE.—Ouvrage commencé par M. Vivien de Saint-Martin et continué par Fr. Schrader. No. 46, Asie en 10 Feuilles (Feuille 1, Asie Mineure et Caucasie). Scale, 1:5,000,000, or 78.9 statute miles to an inch. Librairie Hachette et Cie, Paris, 1903.

This is Sheet 1 of the 10-sheet map of western central, eastern, and southern Asia, including all of it except Siberia, which has already appeared. As in all the previous sheets of this atlas, the work of the geographer and cartographer is of the highest quality. No one skilled in map-reading can examine the sheet without pleasure. The Caucasus Mountains and the ranges of northern Persia would test the skill of the most expert map engravers; and it is not too much to say that the orographical aspects of these regions are here defined with wonderful clearness and intelligence, as far as explorers and surveyors have supplied the essential data. A small omission that may easily be remedied is the absence of the minus sign before the figures 26 in the Caspian Sea to indicate that its surface lies 26 metres below the level of the Black Sea. All the Turkish, Persian, and Russian geographical terms employed on the map are defined.

ACCESSIONS TO THE LIBRARY.

JANUARY–MARCH, 1905.

AFRICA.

DIETEL, R. W.—Missionsstunden. 5tes Heft: Abessinien. 2te Auflage, neu bearbeitet von P. C. Paul. Dresden—A., C. Ludwig Ungelenk, 1905. 16mo.

ESCH, ERNST. SOLGER, FR(IEDRICH). OPPENHEIM (PAUL). UND JAEKEL, O.—Beiträge zur Geologie von Kamerun. Karte, &c. Stuttgart, E. Nägele, 1904. pr., 8vo. [*Gift, from the Auswärtiges Amt, Berlin.*]

HARTMANN, GEORG.—Die Zukunft Deutsch-Südwestafrikas. Berlin, Ernst S. Mittler und Sohn, 1904. pr., 8vo.

LAGOS.—Blue Book for the Year 1903. London, Waterlow & Sons, 1904. fol. [*Gift from the Colonial Secretary, Lagos.*]

LEROY-BEAULIEU, PAUL.—Le Sahara, le Soudan et les Chemins de Fer Transsahariens. Carte. Paris, Guillaumin et Cie., 1904. 8vo.

LOTH, GASTON.—Le Peuplement Italien en Tunisie et en Algérie. (Cartes et gravures.) Paris, Armand Colin; 1905. 8vo.

MARÈS, ROLAND DE.—The Congo. Brussels, J. Lebègue & Co. (1904). 8vo.

PAUL, CARL.—Die Mission in unsern Kolonien. Drittes Heft: Deutsch-Südwestafrika. Illustrationen und Karte. Dresden, C. L. Ungelenk, 1905. 16mo.

RENOUARD, G. L'Ouest Africain et les Missions Catholiques: Congo et Oubanghi. (Cartes, &c.) Paris, H. Oudin [1904]. 8vo.

STENGEL, KARL FREIH. VON.—Der Kongostaat: Eine kolonialpolitische Studie. München, Carl Haushalter, 1903. pr., 8vo.

THOMAS, OWEN.—Agricultural and Pastoral Prospects of South Africa. (With map.) London, A. Constable & Co., 1904. 8vo.

VERNER, SAMUEL P.—Pioneering in Central Africa. (Maps, &c.) Richmond, Presbyterian Committee of Publication, 1903. 8vo.

WACK, HENRY WELLINGTON.—Story of the Congo Free State. 125 Illustrations and Maps. New York and London, G. P. Putnam's Sons, 1905. 8vo.

WILLCOCKS, SIR WILLIAM.—The Nile in 1904. (21 Plates.) London, E. & F. N. Spon, Ltd.; New York, Spon & Chamberlain, 1904. 8vo. [*Gift, from the Author.*]

AMERICA.

CAIX, ROBERT DE. Terre-Neuve, Saint Pierre et le French-Shore. La Question des Pêcheries et le Traité du 8 avril 1904. Paris, Société Française d'Imprimerie et de Librairie, 1904. 12mo.

[CHILE.]—Demografia Chilena, Rectificaciones a las Publicaciones Oficiales. Valparaiso, Imprenta Alemana, 1904. pr., 8vo.

CONANT, THOMAS.—Life in Canada. (Illustrations.) Toronto, William Briggs, 1903. 8vo.

DUSSIEUX, L.—Le Canada sous la Domination Française. D'après les archives de la marine et de la guerre. [Carte.] 3e Edition. Paris, Victor Lecoffre, 1883. 12mo.

FERNANDEZ, LEON.—Colección de Documentos para la Historia de Costa Rica. 2 Tomos. San José de Costa Rica, Imprenta Nacional, 1881–1882. 8vo.

FISHER, GEORGE PARK.—Colonial Era in America. Maps. London, Sampson Low, Marston & Co., 1892. 16mo.

GANONG, WILLIAM F.—Monograph of the Origins of the Settlements in New Brunswick. [With maps.] *From the Transactions of the Royal Society of Canada, 2nd Ser. Vol. X. Sec. II.* Ottawa (Royal Society of Canada), 1904. 8vo.

HEAD, SIR GEORGE.—Forest Scenes and Incidents in the Wilds of North America, etc. 2nd Edition. London, John Murray, 1838. 12mo.

HENNEPIN, LOUIS.—New Discovery of a Vast Country in America. Reprinted from the 2nd London issue of 1698 . . . with maps, &c. Introduction, Notes and Index by Reuben Gold Thwaites. Chicago, A. C. McClurg & Co., 1903. 2 vols. 8vo.

HOLDICH, SIR THOMAS HUNGERFORD.—The Countries of the King's Award. [Chile and Argentina.] Illustrations [and Map]. London, Hurst and Blackett, 1904. 8vo.

HULBERT, ARCHER BUTLER, AND OTHERS.—The Future of Road Making in America. Illustrations. *Historic Highways of America, Vol. 15.* Cleveland, Arthur H. Clark Co., 1905. 8vo.

IHERING, H. VON.—The Anthropology of the State of S. Paulo, Brazil. S. Paulo, Duprat & Comp, 1904. pr., 8vo. [*Gift from the Author.*]

JANVIER, THOMAS A.—The Dutch Founding of New York. Illustrated. New York and London, Harper and Bros., 1903. 8vo.

KIP, WILLIAM INGRAHAM.—Historical Scenes from the old Jesuit Missions. New York, A. D. F. Randolph & Co. (1875). 16mo.

LAHONTAN, BARON DE.—New Voyages to North America. Reprinted from the English edition of 1703, with facsimiles of original title-pages, &c. Introduction, Notes and Index by Reuben Gold Thwaites. Chicago, A. C. McClurg & Co., 1905. 2 vols. 8vo.

MANGELS, H.—Wirtschaftliche, naturgeschichtliche und klimatologische Abhandlungen aus Paraguay. [Illustrated.] München, Fr. P. Datterer & Cie, 1904. 8vo.

MARYLAND, Report on the New Map of. 1834, '35, '36. [14 maps.] Annapolis, W. M'Neir. 2 vols., 8vo.

OWEN, MARY ALICIA.—Folk-Lore of the Musquakie Indians of North America and Catalogue of Musquakie Beadwork &c. in the Collection of the Folk-Lore Society. With 8 Plates, &c. London, David Nutt, for the Folk-Lore Society, 1904. 8vo.

SCARLETT, P. CAMPBELL.—South America and the Pacific : . . . a journey across the Pampas and the Andes, &c. London, Henry Colburn, 1838. 2 vols. 8vo.

SIEVERS, WILHELM.—Südamerika und die deutschen Interessen. Stuttgart, Strecker & Schröder, 1903. 8vo.

STEEDMAN, CHARLES J.—Bucking the Sagebrush, or the Oregon Trail in the Seventies. Illustrations and map. New York, G. P. Putnam's Sons, 1904. 8vo. [*Gift, from J. B. Ford, New York.*]

WALLACE, DILLON.—The Lure of the Labrador Wild : Story of the Exploring Expedition conducted by Leonidas Hubbard, Jr. Illustrations and maps. New York, Fleming H. Revell Co. (1905). 8vo.

WEST INDIA PILOT. Compiled by Capt. E. Barnett, R. N. Vol. I: Cape North of the Amazons to Cape Sable in Florida, with Outlying Islands. Vol. II: Caribbean Sea from Barbados to Cuba; Bahama and Bermuda Islands and Florida Strait. London, Hydrographic Office, Admiralty, 1861–1866. 8vo.

WRIGHT, MARIE ROBINSON.—The Republic of Chile. (Illustrations.) Philadelphia, Geo. Barrie & Sons, 1904. 4to.

ASIA.

ANNANDALE, NELSON, AND ROBINSON, HERBERT C.—Fasciculi Malayenses. Anthropological and Zoological Results of an Expedition to Perak and the Siamese Malay States, 1901–1902. (Illustrations and maps.) Anthropology Parts I and IIa, and Supplement: Zoology, Part I; and Report from Part III. London, Williams & Norgate; Longmans, Green & Co., 1903–1904. 5 Parts. 4to.

BECCARI, ODOARDO.—Wanderings in the Great Forests of Borneo. Translated by E. H. Giglioli. Revised and Edited by F. H. H. Guillemard. (Illustrations and maps.) London, Archibald Constable & Co., 1904. 8vo.

BORNEO, BRITISH NORTH, Views of. With a brief history of the Colony, compiled from official records. [Maps.] London, Brit. N. Borneo Co., 1899. Long 4to.

CROOKE, W.—The Popular Religion and Folk-Lore of Northern India. New Edition, revised and illustrated. Westminster, Archibald Constable & Co., 1896. 2 vols., 8vo.

DAY, CLIVE.—The Policy and Administration of the Dutch in Java. New York, The Macmillan Co., 1904. 8vo.

DOUMER, PAUL.—L'Indo Chine française (Souvenirs). (Illustrations, cartes, &c.) Paris, Vuibert et Nony, 1905. 4to.

DUTREUIL DE RHINS, J. L.—Le Royaume d'Annam et les Annamites. Journal de Voyage. 2e Edition. 2 Cartes, etc. Paris, E. Plon, Nourrit et Cie, 1889. 12mo.

FARRER, REGINALD J.—The Garden of Asia: Impressions from Japan. London, Methuen & Co. (1904). 16mo.

LANE-POOLE, STANLEY.—Mediæval India under Mohammedan Rule: 712–1764. (Illustrations.) New York, G. P. Putnam's Sons, 1903. 16mo. *Story of the Nations Series.*

LYNCH, W. F.—Narrative of the United States' Expedition to the River Jordan and the Dead Sea. Maps, &c. Philadelphia, Lea & Blanchard, 1849. 8vo.

MINOCCHI, SALVATORE.—Per la Manciuria a Pechino. Illustrato da 58 incisioni. Firenze, Bernardo Seeber, 1904. 16mo.

MURILLO-VELARDE, PEDRO.—Geographia Historica de las Islas Philipinas, del Africa, y de sus Islas Adyacentes. En Madrid, Gabriel Ramirez, 1752. sq. 8vo.

OLUFSEN, O.—The Second Danish-Pamir Expedition: Vocabulary of the Dialect of Bokhara. Edited by Dr. Phil. Vilh. Gronbech. (Copenhagen), Nordisk Forlag, 1905. 8vo. [*Gift, from the Author.*]

PUINI, CARLO [*Editor*].—Il Tibet. (Geografia, Storia, Religione, Costumi.) Secondo la relazione del viaggio del P. Ippolito Desideri (1715–1721). *Memorie della Società Geografica Italiana, Volume Decimo.* Roma, 1904. 8vo.

Ragozin, Zénaïde A.—Vedic India. (Illustrations.) New York, G. P. Putnam's Sons, 1902. 8vo. *Story of the Nations Series.*

Rhys-Davids, T. W.—Buddhist India. (Illustrations and map.) New York, G. P. Putnam's Sons, 1903. 8vo. *Story of the Nations Series.*

Siam.—General Report on the Operations of the Royal Survey Department, 1901–02. [Maps, etc.] Bangkok, American Presbyterian Mission Press, 1902. Folio. [*Gift, from the Director, Royal Survey Dep't, Bangkok.*]

Stein, M. A.—Preliminary Report on a Journey of Archæological and Typographical Exploration in Chinese Turkestan. [Illustrated.] London, Eyre & Spottiswoode, 1901. 4to.

Ular, Alexandre.—A Russo-Chinese Empire. An English version of "Un Empire Russo-Chinois." Westminster, A. Constable & Co., 1904. 8vo.

Uhlig, C.—Vom Kilimandscharo zum Meru. Vorläufige Mitteilungen über eine Forschungsreise. 21 Abbild. und 1 Kartenskizze. *Sonderabdruck aus der Zeitschrift der Gesellschaft für Erdkunde zu Berlin, Jahrgang 1904, No. 9 u. 10.* Berlin, W. Pormetter. pr., 8vo. [*Gift, from the Author.*]

Van den Berg, N. P.—Uit de Dagen der Compagnie. Haarlem, H. D. Tjeenk Willink & Zoon, 1904. 8vo.

AUSTRALASIA.

Australian Hand-Book, 1905. Maps, Plans, etc. London, Gordon & Gotch. 8vo.

Dadelszen, E. J. von.—New Zealand Official Year-Book, 1904. Wellington, N. Z. Government Printer. 8vo. [*Gift, from the Registrar-General, Wellington.*]

Gregory, J. W.—The Climate of Australasia in reference to its control by the Southern Ocean. (Illustrations.) Melbourne, Whitcombe & Tombs (1904). pr., 16mo.

Gregory, J. W.—Geography of Victoria: Historical, Physical, and Political. (Illustrated.) Melbourne, Whitcombe & Tombs (1903). 16mo.

Glasser, E.—Rapport à M. le Ministre des Colonies sur les Richesses Minérales de la Nouvelle-Calédonie. (Extrait des Annales des Mines, 2e semestre 1903 et 1er semestre 1904.) (Planches.) Paris, Vve Ch. Dunod, 1904. 8vo.

EUROPE.

Appleton, Nathan.—Russian Life and Society, as seen in 1866–'67 by Appleton and Longfellow. (Illustrations.) Boston (Murray & Emery), 1904. 16mo. [*Gift, from the Author.*]

Balfour, M. C.—Examples of Printed Folk-Lore concerning Northumberland. Edited by Northcote W. Thomas. *County Folk-Lore, Vol. IV.* London, David Nutt, for the Folk-Lore Society, 1904. 8vo.

Becker, F.—Wasserstrassen zu und in der Schweiz. Mit einer Kartenskizze. *Separat-Abdruck aus den "Mitteilungen der Ostschweizer. Geograph.-Commerc. Gesellschaft.* Zürich, Albert Müller. 1904. pr., 8vo.

Douglas, Sir Robert K.—Europe and the Far East. (Maps.) Cambridge, University Press, 1904. 8vo.

Forel, F. A.—Le Léman. Monographie Limnologique. Tome III. [completing the work.] Cartes, etc. Lausanne, F. Rouge et Cie, 1904. 8vo.

HANN, J.—Die Anomalien der Witterung auf Island in dem Zeitraume 1851 bis 1900 und deren Beziehungen zu den gleichzeitigen Witterungsanomalien in Nordwesteuropa. *Aus den Sitzungsberichten der k. Akad. der Wissens. in Wien. Mathm.-naturw. Klasse; Bd. CXIII. Abt. II a. Jänner, 1904.* pr., 8vo. [*Gift, from the Author.*]

HANN, J.—Klimatographie von Niederösterreich. Herausgegeben von der Direktion der K. K. Zentralanstalt für Meteorologie und Geodynamik. [With map.] *Klimatographie von Österreich, I.* Wien, W. Brau-Müller, 1904. pr., 8vo.

LONDON AND ITS ENVIRONS. Handbook for Travellers. 4 maps and 24 plans. 14th Revised Edition. Leipzig, Karl Baedeker, 1905. 16mo.

LORENZ, D. E.—The Mediterranean Traveller. A Handbook of Practical Information. Maps and Illustrations. New York, Fleming H. Revell Co. (1905). 8vo.

OKEY, THOMAS.—The Story of Venice. Illustrated by Nelly Erichsen. (Maps.) London, J. M. Dent & Co., 1905. 12mo. *Mediæval Towns Series.*

PHILLIPS, E. C. (Mrs. Horace B. Looker).—Russia: The Land of the Great White Czar. Illustrated. London, *et al.*, Cassell & Co., 1904. 16mo.

GEOGRAPHY.

CLAPARÈDE, ARTHUR DE.—Le Huitième Congrès International de Géographie (7–22 septembre 1904.) Rapport. . . . (Extrait du Globe, Journal géographique, Société de Géographie de Genève, Tome XLIV, Mémoires.) Genève, Société Générale d'Imprimerie, 1905. 8vo. [*Gift, from the Author.*]

FRIEDRICH, ERNST.—Allgemeine und spezielle Wirtschaftsgeographie. Mit 3 Karten. Leipzig, G. J. Göschen, 1904. 8vo.

GREGORY, J. W.—The Teaching of Geography. (Illustration.) Melbourne, Whitcombe & Tombs. (2nd Edition, 1904.) pr., 16mo.

HAENTZSCHEL, EMIL.—Das Erdsphäroid und seine Abbildung. 16 Text-Abbildungen. Leipzig, B. G. Teubner, 1903. 8vo.

HERBERTSON, A. J.—Commercial Geography. (Part I) British Isles. (Part II) The World outside the British Isles. (Maps, &c.) London and Edinburgh, W. and R. Chambers, 1903–1905. 16mo.

KRÜMMEL, O.—Ausgewählte Stücke aus den Klassikern der Geographie für den Gebrauch an Hochschulen. 3te Reihe. 21 Abbildungen. Kiel und Leipzig, Lipsius & Tischer, 1904. 8vo.

LESPAGNOL, G.—L'Evolution de la Terre et de l'Homme. (Cartes et Gravures.) Paris, Ch. Delagrave [1904]. 8vo.

LINDE, RICHARD.—Die Lüneburger Heide. Karte u. Abbild. Bielefeld und Leipzig, Velhagen & Klasing, 1904. 8vo. *Land und Leute, Nr. XVIII.*

POHLE, LUDWIG.—Die Entwicklung des deutschen Wirtschaftslebens im 19. Jahrhundert. Leipzig, B. G. Teubner, 1904. 16mo.

HISTORY.

FERRIER, J. P.—History of the Afghans. Translated . . . by Capt. William Jesse. [Maps.] London, John Murray, 1858. 8vo.

MASSACHUSETTS HISTORICAL SOCIETY, Proceedings, 1903–1904. Second Series, Vol. XVIII. Boston, Mass. Hist. Society, 1905. 8vo.

MOMMSEN, THEODOR.—History of Rome. Translated . . . by W. P. Dickson. New Edition. New York, Scribner, Armstrong & Co., 1872. 4 vols. 8vo.

MOMMSEN, THEODOR.—History of Rome: The Provinces . . . From Cæsar to Diocletian. Translated by W. P. Dickson. 10 maps. New York, Charles Scribner's Sons, 1887. 2 vols. 8vo.

MAPS AND ATLASES.

AMERICA, MAPS ILLUSTRATING EARLY DISCOVERY AND EXPLORATION IN, 1502–1530.—Reproduced by Photography from the Original MSS. Issued under the Direction of Edward Luther Stevenson. No 4: Maggiolo, 1519 (1 sheet). New Brunswick, N. J., 1905. Portfolio.

AMERICA, NORTH.—[A School map, in Hungarian.] *Scale:* 1: 8,000,000=126.2 miles=1 inch. *Size:* 36¼ x 48 inches. Mounted to roll. Coloured. Map of Hungary on same scale in the margin. Budapest, 1900. [*Gift, from Dr. Béla Erödi.*]

AMERICA, SOUTH.—[A School map, in Hungarian.] *Scale:* 1: 8,000,000=126.2 miles=1 inch. *Size:* 36¼ x 48 inches. Mounted to roll. Coloured. Map of Hungary on same scale in the margin. Budapest, 1900. [*Gift, from Dr. Béla Erödi.*]

ASIA.—[A School, Physical map in Hungarian.] *Scale:* 1: 8,000,000=126.2 miles=1 inch. *Size:* 62½ x 54 inches. Mounted to roll. Coloured. Budapest, 1903. [*Gift, from Dr. Béla Erödi.*]

ATLAS DER NEDERLANDSCHE BEZITTINGEN IN OOST INDIË.—Door J. W. Stemfoort en J. J. Ten Siethoff. Departement van Koloniën . . . s'Gravenhage. Directeur C. A. Eckstein, 1883–85. [14 Sheets, various scales. *Size:* 33 x 23 inches. [*Gift, from the Ministry of Colonies, The Hague.*]

ATLAS. PEIP, CHR.—Taschen-Atlas über alle Teile der Erde. 36 Haupt- und 70 Nebenkarten. Mit geographisch-statistischen Notizen von Otto Weber. Stuttgart u. Leipzig, Deutsche-Verlags-Anstalt, 1904. 16mo.

BELGIQUE.—Carte des Chemins de Fer, Routes et Voies Navigables. *Scale:* 1: 320,000=5.05 miles=1 inch. *Size:* 31¾ x 27 inches. 1905. Bruxelles, Institut Cartographique Militaire. [*Gift, from the Ministère de la Guerre, Brussels.*]

BELGIQUE.—Tableau d'Assemblage des Cartes de la. Avec Liste Alphabétique des noms des Communes. *Scale:* 800,000=12.6 miles=1 inch. *Size:* 14⅜ x 11¾ inches. 1904. Bruxelles, Institut Cartographique Militaire. [*Gift, from the Ministère de la Guerre, Brussels.*]

[CHILE] BAHIA TONGOI.—Por la Comision de Faros . . . 1889, por la Comision Hidrográfica, . . . 1890, 1901 i 1904. Valparaiso, Oficina Hidrográfica, 1904. *Scale:* 1: 50,000 or 1½ nautical miles=1 inch. *Size:* 13¾ x 9⅞ inches. [*Gift, from the Oficina Hidrográfica, Valparaiso.*]

[CHILE.]—Golfo Corcovado; Estero Palvitao, Rio Yelcho, Ensenada Chaiten. Levantado por la Comision Hidrográfica de la Cañonera Pilcomayo en 1900 . . . *Scale:* 1: 50,000=1½ n. miles=1 inch. *Size:* 18⅞ x 22⅞ inches. [Valparaiso.] Oficina Hidrográfica, 1904.

[EAST INDIES, DUTCH.]—Eilanden en Vaarwaters beoosten Java, Blad II. *Scale:* 1: 1,000,000=13 nautical miles=1 inch. *Size:* 30¼ x 19½ inches. Batavia, Hidrographisch Bureau, 1882 [corrected to 1902]. Photolithographed. [*Gift, from the Ministry of Marine, Hydrographic Department, The Hague.*]

HUNGARY.—Map [in Hungarian]. With inset of the Tatra Mountains. *Scale:* 1: 600,000=9.4 miles=1 inch. *Size:* 63 x 44 inches. Mounted to roll. Coloured. Budapest, 1902. [*Gift, from Dr. Béla Erödi.*]

JAPANESE EMPIRE.—Topographical Map of the. *Scale:* 1:1,000,000 [5 Inset maps, various scales.] Tokyo, Imperial Geological Survey of Japan, 1899. *Size:* 60 x 70¼ inches. Coloured. [*Gift, from N. Williams McIvor, Yokohama.*]

[RHIO AND LINGA ARCHIPELAGO.]—Riouw en Lingga Archipel, Blad I. *Scale:* 1:250,000=3½ nautical miles=1 inch. *Size:* 34⅝ x 25¾ inches. 's-Gravenhage, Ministerie van Marine, 1901. Engraved. [*Gift, from the Ministry of Marine, Hydrographic Department, The Hague.*]

[SUNDA ISLANDS.]—Kleine Soenda Eilanden en aangrenzende Vaarwaters, Blad III. *Scale:* 1:500,000=6.7 nautical miles=1 inch. *Size:* 34¾ x 22¾ inches. Batavia, Hydrographisch Bureau, 1891 [corrected to 1901]. Engraved. [*Gift, from the Ministry of Marine, Hydrographic Department, The Hague.*]

TRANSVAAL, WITWATERSRAND GOLD FIELDS.—Standard Map, compiled by Frank Flowers, C. E. *Scale:* 1:40,000=1½ inches=1 mile. *Size:* [3 sheets joined] 84 x 37 inches. [With enlarged insets of 4 selected districts.] London, Geo. Philip & Son [1904]. Coloured.

UNITED STATES AND CANADA, Map showing Lines of the Bell Telephone Companies. July 1st, 1904. *Scale:* 80 miles = 1 inch. *Size:* 39 x 25 inches. Boston and New York, Am. Telephone and Telegraph Co. Coloured. [Two copies.—*Gift, from W. McA. Smith, New York.*]

UNITED STATES [showing the territories operated by local telephone companies. Photograph, reduced from the Geological Survey United States map of 1898]. *Size:* 13 x 8½ inches. [*Gift, from W. McA. Smith, New York.*]

WORLD.—Mercator's projection. [Hungarian Text.] *Scale:* 1:20,000,000 = 316 miles = 1 inch. *Size:* 78½ x 52 inches. Mounted to roll. Coloured. Budapest [1900?] [*Gift, from Dr. Béla Erödi.*]

POLAR.

PARISET, E.—Vers la Terre Polaire Australe. [*Extrait des Mémoires de l'Académie des Sciences, Belles-Lettres et Arts de Lyon.* [3 maps.] Lyon, A. Rey, 1904. 8vo. [*Gift, from the Author.*]

PIRIE, J. H. HARVEY, AND BROWN, R. N. RUDMOSE.—The Scottish National Antarctic Expedition: Second Voyage of the Scotia. (With Map and Illustrations.) *Extract Scottish Geographical Magazine, Vol. XXI, No. 1, Jan., 1905.* Edinburgh, 1905. pr., 8vo. [*Gift, from the Authors and Mr. W. S. Bruce.*]

SPITSBERGEN, EARLY DUTCH AND ENGLISH VOYAGES TO, in the Seventeenth Century, etc., etc. Edited, with Introductions and Notes by Sir W. Martin Conway. (Reproduced maps, etc.) London, Hakluyt Society (*Second Series, No. XI.*) 1904. 8vo.

VARIOUS.

BELL, RALCY HUSTED.—The Worth of Words. 3rd Edition. New York, Hinds and Noble (1903), 12mo. [*Gift, from the Author.*]

(CASSINO, SAMUEL EDSON, *Editor.*)—Naturalists' Universal Directory: Containing Names, Addresses and Special Subjects of Study, of Professional and Amateur Naturalists in all Parts of the World. Salem, Mass., S. E. Cassino, 19th Edition, 1905. 8vo.

CLARK, ARTHUR H.—History of Yachting, 1600–1815. Published . . . . by direction of the New York Yacht Club. (Illustrations.) New York, G. P. Putnam's Sons. 1904. 8vo. [*Gift, from J. B. Ford, New York.*]

De Launay, L.—La Science Géologique, Ses Méthodes—Ses Résultats—Ses Problèmes—Son Histoire. (6 Planches, 38 Figures.) Paris, Armand Colin, 1905. 8vo.

Elemente der Terrainlehre des Kartenlesens und Croquierens. [With Table.] Brody, F. West, 1904. 16mo.

Encyclopædia, Jewish.—Vol. IX. Mornoczyk-Philippson. Illustrated. New York and London, Funk & Wagnalls Co., 1905. 8vo.

[Encyclopædia.] Meyers Grosses Konversations-Lexikon. (6te Auflage.) Band IX. Leipzig u. Wien, Bibliographisches Institut, 1905. 8vo. Illustrated.

Frœlicher, Capitaine.—Trois Colonisateurs: Bugeaud, Faidherbe, Galliéni. Ouvrage couronné par la Société de Propagande coloniale. 3 Photographies et 4 cartes. Paris, H. Charles-Lavauzelle. [1904.] 8vo.

Hague, James D.—A Doubtful Island of the Pacific. [With 2 sketch-maps and illustrations.] *Reprinted from the National Geographic Magazine, Dec., 1904.* Washington, D. C., 1904. pr., 8vo. [*Gift, from the Author.*]

Hakluyt, Richard.—Principal Navigations, Voyages, Traffiques and Discoveries of the English Nation. [New Edition.] (Illustrations.) *Extra Series, Hakluyt Society.* Vols. IX–XI. Glasgow, James McLehose & Sons, 1904. 8vo.

Johnson, W. H.—The Cultivation and Preparation of Para Rubber. (Illustrations.) London, Crosby Lockwood & Son, 1904. 8vo.

Kalecsinszky, Alexander V.—Über die akkumulation der Sonnenwärme in Verschiedenen Flüssigkeiten. *Sonderabdruck aus dem Mathemat. u. Naturwiss. Berichte aus Ungarn, XXI.* Leipzig, B. K. Teubner, 1904. pr., 8vo.

Kesslitz, Wilhelm, und Rössler, Karl.—Grundzüge der Maritimen Meteorologie. [9 maps.] Pola und Fiume, Buchdruckerei von Ig. v. Kleinmayr & Fed. Bamberg in Laibach, 1904. 8vo. [*Gift, from the Authors.*]

Lydekker, R.—Mostly Mammals. Zoological Essays. With 16 full-page illustrations. New York, Dodd, Mead & Co.; London, Hutchinson & Co., 1903. 8vo.

Marco Polo, The Most Noble and Famous Travels of. The Translation of Marsden, revised by Thomas Wright. (Maps, a genealogy of the Khans of Tartary, etc., added.) [Portrait.] London, George Newnes, 1904. 16mo.

Meinardus, Wilh.—The following Separates, presented by the Author:

Ueber das Wetterleuchten. *Meteorologische Zeitschrift, Januar, 1894.*

Eine neue Methode zur Berechnung mittlerer Meerestiefen. *Verhandlungen d. Gesellsch. f. Erdkunde zu Berlin, 1895, Nr. 1.*

Der Eisregen vom 20. Oktober 1898 über Mittel- und Ost-Deutschland. "*Das Wetter,*" *Meteorologische Monatschrift für Gebildete aller Stände. Heft 11, 1898.*

Ueber die Methoden der maritimen Klimatologie. "*Das Wetter,*" *Heft 2 und 3, 1900.*

Der Staubfall vom 10. und 11 März 1901, "*Das Wetter,*" *Heft 4, 1901.*

Ueber einige bemerkenswerte Staubfälle der letzten Zeit. "*Das Wetter,*" *Heft 12, 1903.*

Ueber die absolute Bewegung der Luft in fortschreitenden Zyklonen. *Meteorologische Zeitschrift, Dezember 1903.*

Mémoires de la Société Royale des Antiquaires du Nord, 1845–1849. (Map.) Copenhagen, La Société [1849]. 8vo.

MONIER-WILLIAMS, SIR MONIER.—Buddhism, in its connection with Brāhmanism and Hindūism and its contrast with Christianity. (Map, etc.) New York, Macmillan & Co., 1889. 8vo.

REITEMEYER, ELSE.—Beschreibung Ägyptens im Mittelalter aus den geographischen Werken der Araber. Leipzig, Seele & Co., 1903. 8vo.

RÖSSLER, CARL.—Grundzüge der Ozeanographie. 2te Auflage. [4 maps.] Fiume, Buchdruckerei von Ig. v. Kleinmayr und Fed. Bamberg in Laibach, 1903. 8vo. [*Gift, from the Author.*]

SARGENT, CHARLES SPRAGUE.—Manual of the Trees of North America (Exclusive of Mexico). With 644 illustrations. Boston and New York, Houghton, Mifflin & Co., 1905. 8vo.

SIEBERG, AUGUST.—Handbuch der Erdbebenkunde. Mit 113 Abbild. und Karten im Text. Braunschweig, Friedrich Vieweg und Sohn, 1904. 8vo.

THALBITZER, WILLIAM.—A Phonetical Study of the Eskimo Language. Based on Observations made on a Journey in North Greenland, 1900–1901. Map, etc. *Reprint from Meddelelser om Grönland, Vol. XXXI.* Copenhagen, Bianco Luno, 1904. 8vo. [*Gift, from the Author.*]

UMLAUFT, FR.—Kleines Statistisches Taschenbuch über alle Länder der Erde. 11ter Jahrgang. Wien und Leipzig, A. Hartleben, 1904. 16mo.

VOLLKOMMER, MAX.—Die Quellen Bourguignon d'Anvilles für seine Kritische Karte von Africa. Gekrönte Preisschrift. *Münchener Geographische Studien S. Günther, 16. Stück.* München, Th. Ackermann, 1904. pr., 8vo.

WEBER-VAN BOSSE, MEVROUW A.—Een Jaar aan Boord H. M. Siboga. (Kaart, etc.) Tweede Druk. Leiden, E. J. Brill (1904). Square 8vo.

WHITAKER'S ALMANACK, 1905.—London, J. Whitaker. 8vo.

WHO'S WHO, 1905.—An Annual Biographical Dictionary. London, Adam and Charles Black. 8vo.

BOOK NOTICES.

Weltwirtschaftliche Neubildungen. By Paul Dehn. (Second Edition). viii and 366 pp. Allgemeiner Verein für Deutsche Litteratur, Berlin, 1904.

A series of essays on economic and industrial questions in their broadest relations. A few of the titles give a good idea of the scope of the book: "The Development of World Industries," "Tariff Wars," "National Depreciation of Foreign Products," and "Bankrupt States." While the author writes with much ability and information his clarity of vision may be impaired in many matters by his tendency to regard the United States of America as dangerous to the wellbeing of Europe.

Svenska Turistföreningens Årsskrift för År 1904. viii and 463 pp., 200 Illustrations and 5 Sketch Maps. Wahlström & Widstrand, Stockholm, 1904.

A description of Sweden, with special reference to information required by tourists. Numerous routes are given and many half-tone illustrations show various aspects of the country, including the fishing fleets.

Allgemeine und Spezielle Wirtschaftsgeographie. By Dr. Ernst Friedrich. 370 pp., 3 Maps and Index. G. J. Göschen'sche Verlagshandlung, Leipzig, 1904. (Price, M. 6.80.)

Dr. Friedrich has recently attracted much attention as a writer on economic geography. It is doubtful if any other writer on the subject has made so enormous a collection of facts as he has done to illustrate this department of geography; and his systematic classification of this material has enabled him to use it very effectively in his writings. The present work is neither a textbook nor a handbook, though it may be read with great profit by advanced students; and the vast array of facts minutely indexed gives the work, in many respects, the quality and usefulness of a handbook.

But the serious purpose of Dr. Friedrich is to show that the method of treating economic geography which he has brought to the front is essential to the most effective study of it. He desires to emphasize man as the great factor in economic geography, and he gives the secondary place to natural conditions. He asserts that S. Günther and other German writers are wrong because they begin their consideration of economic geography with the natural environment and conditions instead of with man and his various forms of industry.

Dr. Friedrich and the other writers, however, do not seem to be very far apart, and both effectively present the subject. So important are environment and other natural conditions in determining the nature and quantity of industrial products that it is not strange if most writers on economic geography make the inter-relations between man and the natural conditions around him very prominent. Their treatment of the subject justifies the use of the term "economic geography," while Dr. Friedrich's method seems to relegate the topic to some branch of economics.

In the development of his method Dr. Friedrich shows man and his industrial activity in process of evolution—first, the stage of animal economy (*tierische Wirtschaft*), in which man, like the lower animals, satisfies his wants merely by collecting the articles needed for his food, clothing, and shelter. In the second stage of instinctive economy man is aided by his instinct in collecting the necessities of life, he has invented more implements to help him than he possessed in the first stage of struggle and progress is made in agriculture and stock-raising. In the third stage he has the advantage of traditions handed down orally, or even reduced to writing, so that in this era of traditional economy he may benefit by the experience of his fathers. The fourth stage is that of scientific economy, when various peoples have obtained an insight, more or less profound, into the relations between man and nature, and have learned in a high degree to utilize natural forces for man's benefit.

Nearly one-fourth of the book is devoted to the development of these ideas, and the remainder, exclusive of the index, is given to the special consideration of the various countries, an enormous number of facts being cited. Their application to the basal features of the study, as propounded by the author, must be made by the reader, as most of the facts are stated baldly, with no attempt to show their relation ships. One of the three maps shows the areas now occupied by man in each of the four stages of economic culture; another shows the distribution of the forms of industry from collections of vegetable products, such as rubber, through fisheries, hunting, planting, stock-raising, and mining to manufactures, transportations, and trade. The third map shows the economic zones as determined by climate. The author has certainly enriched the study of economic geography on the human side, and for this and the wealth of illustrative and accurate fact which he has collected his writings cannot be overlooked in any satisfactory study of this subject.

Uit de Dagen der Compagnie. By N. P. Van Den Berg. 419 pp. No Index. H. D. Tjeenk & Son, Haarlem, Netherlands, 1904. (Price, paper fl. 3.90, cloth fl. 4.50.)

The author treats ten historical topics relating to the Dutch East Indies when they were under the rule of the East India Company. Among them are "Five Years in Banda" (1633–38); "A Petition of the People of Batavia" (1648); "The Theatre in Batavia in Early Times," "Early Reports on Krakatau. The Eruption of 1680;" and "The Sugar Industry of Java under the East India Company."

Pathfinders of the West. By A. C. Laut. xxv and 380 pp., 58 Illustrations, 3 Maps, Appendix and Index. The Macmillan Company, New York, 1904. (Price, $2.)

In this book Miss Laut tells the story of the great journeys in the western and northern part of North America of Radisson, De la Vérendrye, Samuel Hearne, Alexander Mackenzie, and Lewis and Clark. Nearly half the volume is given to Radisson, a French pioneer who antedated Marquette, Joliet, and La Salle. Most encyclopædias have failed to mention Radisson, though he had a genius for pioneering, was absolutely fearless, courted the most dare-devil adventures, tramped over much of the Mississippi valley between Missouri and Minnesota where no white man had preceded him, went overland to Hudson Bay, was instrumental in forming the Hudson Bay Company, and was denounced by many of his contemporaries as a rascal. Miss Laut claims for him the honour of being the great original pathfinder of the West, and denies that Marquette, Joliet, and La Salle were pathfinders at all, because Radisson and his brother-in-law "had discovered the West" twelve years before they had thought of visiting it.

The proof is adequate that Radisson travelled extensively even to the west of the Mississippi, and Miss Laut is to be thanked for helping to rescue from oblivion the name of the man who was as remarkable for his sufferings and hair-raising adventures as for his achievements. But if Radisson was a pathfinder and his contemporaries did not deserve this title they at least left records and maps by which we can tell where they saw many of the geographical aspects they described. It is difficult to put one's finger on Radisson in the wide field of his wanderings, and it is often impossible to say much more than that he "was there or thereabouts." The prizes of discovery or geographic instinct were not the chief impelling influences that led him on, but they were the love of adventure and, above all, the quest for furs; and it was not policy for him minutely to reveal his itineraries.

Miss Laut's story of Radisson and her narrative of the great journeys of other explorers in this volume are full of animation and sympathy. She has the art of putting things, and her readers see with her the very life and breathe the air of the pioneer days in the West. She thoroughly knows the West and its history; and few writers on the pathfinder days of the northern two-thirds of North America have so vividly and accurately portrayed, as she has done, the adventures of the pioneers of discovery, the perils they met, and the life they saw. The present volume fully sustains her reputation.

Rapport à M. le Ministre des Colonies sur les Richesses Minérales de la Nouvelle-Calédonie. Par M. E. Glasser. 545 pp. and 6 Plates. Vve. Ch. Dunod, Paris, 1904. (Price, frs. 10.)

The author had charge of a Government mission to this Pacific island to study its principal mineral resources. He is a mining engineer, and his report adds con-

siderable detail to our knowledge of the mineral wealth of New Caledonia, which is unusually blessed in this regard. He gives three chapters to the geology of the island, and describes the nickel and cobalt mines with much fulness. Copper and other minerals are also described, and nearly 100 pages are given to the coal mines. The plates show the present state of mining development in some of the principal regions. This island and Canada supply nearly all the nickel of the world, and New Caledonia is practically the only source of cobalt.

The Mediterranean Traveller. A Handbook of Practical Information. By D. E. Lorenz. 367 pp., 90 Illustrations, 15 Maps and Plans, and Index. Fleming H. Revell Company, New York and Chicago, 1905. (Price, $2.50.)

Especially prepared for those who visit chiefly the important coast cities. The author's purpose was to arrange just the information desired of the Mediterranean coast show-places, omitting the inland regions, excepting the Holy Land, Egypt, Italy, and Southern Spain, whose various points of interest are fully described. The book will meet the need of such tourists as do not intend to penetrate to many places behind the coasts, to which most guide-books devote the larger part of their space. A page of condensed statistical information and a short bibliography for each country described are useful features. The letterpress is not in the dry style of the ordinary guide-book, but is pithy and interesting in its way of calling attention to things to be seen and remembered.

The large granite columns recently placed in position at the Cathedral of St. John the Divine on Morningside Heights, New York, weigh ninety tons each. This volume tells of three blocks of stone in the enclosing wall at the Great Temple of Baalbek, which are from 62 to 64 feet long and about 13 feet square, each weighing about 1,000 tons.

> How these monster stones were brought from the quarry a mile away and raised, as in some instances, to a height nearly a hundred feet foom the ground will, perhaps, forever remain a mystery, especially as it is asserted that the temple was built before the invention of the lever or the derrick. The usual theory is that they were rolled up an inclined plane of earth especially prepared for the purpose.
>
> Near the quarry itself lies an even larger stone, some seventy feet long and fifteen feet wide, weighing about 1,500 tons, the largest single stone ever quarried and removed from its original place.

A good map in colours shows the communications between the coasts and all parts of Europe. The black maps of countries and the plans of towns are, most of them, on too small a scale and too inadequately executed to be serviceable.

The Garden of Asia. Impressions from Japan. By Reginald J. Farrar. xi and 296 pp. Methuen & Co., London, 1904. (Price, 6 sh.)

A book of impressions rather than of information. The author set himself a difficult task in trying to translate into words the charm that Japan has for the discerning. It is for those who have genuinely felt the charm to say whether his words have adequately translated it. But many who have never seen Japan will agree that these word-pictures make very pleasant reading. This extract, from the chapter on "Shops and Shopping," is a fair sample of the volume :

> In the matted inner room sits a beautiful aged man, with the air, the bearded dignity of a sanctified sage. Reluctantly, and with no desire to sell, he produces for us small gems, Chinese cups and bottles —wonderfully glazed and enamelled with jewels of colour—or green saucers of ade, or the refinements of some Japanese toy in bronze. Everything on his shelves has an air of meticulous cleanliness that suits with its dainty elegancies of contrivance.
>
> So, without any enthusiasm, the old prophet sits among his treasures, dreading the necessity of selling any. He remains immovable in the matter of price. He does not want you to buy his darlings and

carry them away. But, if you really desire them, well, you can take them at his valuation or leave them. And he would prefer this latter alternative. However, the purchase once completed, he follows David's sensible example after his baby's death, and becomes cheerful in the face of the irremediable. He goes into another room, leaving us with the cakes and tea that he has ordered for our entertainment, and returns in a moment with some little fragile, charming present of courtesy—some little carving in wood or kettle in coloured faience. So he bows us out and returns to his meditations in the fragrant dusk of his cavern.

The Australian Handbook (including New Zealand, Fiji, and New Guinea) for 1905. 676 pp., Directory and Business Guide, 223 pp., 4 Pictures, 34 Maps and Index. Gordon & Gotch, London, Melbourne, etc., 1905.

Contains a large variety of facts important for every one who wishes special information about the Australian Commonwealth and other British possessions in the Pacific Ocean. Much space is devoted to the exploration, the geography and geology, resources and statistics of each State and colony. All towns are briefly described, and the tariff schedules, land and mining regulations, etc., are given. The maps include black railroad maps of each State and colony, coloured maps of the same subdivisions; plans of Perth, Melbourne, Adelaide, Wellington, Auckland, Dunedin, Christchurch, and Brisbane; the distribution of minerals in New South Wales, and 4 maps in colours showing the present condition of exploration in Australia, its orographical features, mean annual rainfall, and distribution of vegetation and cultivated crops.

Wanderings in the Great Forests of Borneo. By Odoardo Beccari. Translated by Dr. Enrico H. Giglioli, and revised and edited by F. H. H. Guillemard. xxiv, and 424 pp., 61 Illustrations, Maps of Borneo and Sarawak, Appendix and Index. Archibald Constable & Co., Ltd., London, 1904. (Price, 16s.)

Dr. Beccari only recently prepared for publication this account of his researches in natural history in Sarawak, North Borneo, though the work he describes was done nearly forty years ago. The scientific world will be glad that he yielded to the advice of his friends and has written this interesting and sympathetic story of nature as he found it in Borneo. The work is not out of date, because, as Lady Brooke told Dr. Beccari and as Dr. Guillemard assures his English readers, the vast primeval forests through which the author leads the way in so interesting a manner are to-day as they have been from almost the beginning of things. This record of his early work in Borneo comes after many years of travel and exploration, whose scientific results have been published and whose collections have enriched the great museums of Italy and other countries. His wide knowledge of his special topics gives much value to his descriptions and his theories, though many may not agree with his views as to the origin of species.

The Cultivation and Preparation of Para Rubber. By W. H. Johnson. viii and 99 pp., 6 Illustrations and Index. Crosby Lockwood & Son, London, 1904. (Price, 7s. 6d.)

The fact that the supply of rubber collected from trees and vines growing wild in the forests, bids fair, before many years, to be inadequate for the needs of commerce, gives large importance to the present efforts to develop rubber plantations. Many of these enterprises have met with poor success, as was to be expected in the stage of experimentation. Rubber-planting, however, is increasing in Brazil and in the Congo Free State, and has prospered in an exceptional manner in Ceylon and the Malay Peninsula, where it is developing into a large industry.

The Pará rubber tree (*Hevea brasiliensis*) is the plant that seems to have flourished

best in the plantations of nearly every region where it has been introduced. As it also yields the best quality of rubber in the market, it is highly favoured by planters. There are now about 1,200 acres of *Hevea* trees in Ceylon and a still larger area in the Malay Peninsula.

The Government of the Gold Coast Colony, West Africa, in which Mr. Johnson is Director of Agriculture, sent him in 1902 to Ceylon to study the methods employed there in the cultivation of Pará rubber and other agricultural staples for market, with a view to introducing them into West Africa. This book is devoted to Pará rubber, and it will be very helpful to the increasing number of persons who are taking up rubber cultivation in Africa and other parts of the tropics.

It describes the Pará rubber tree in its native home and abroad, tells what experience has shown as to the best methods of cultivation, devotes a chapter to the insect pests and the fungoid diseases that attack it, gives the methods of rubber-collecting and the preparation of rubber from the latex, treats of the yield from cultivated trees in various regions, and makes suggestions as to the establishment and maintenance of a Pará rubber plantation. The author says that there are in tropical Africa thousands of square miles of land suitable for the cultivation of this rubber tree. A large part of this land has been occupied by rubber plants, which have been greatly diminished in number by the destructive methods of tapping employed by native collectors.

The Travels of Marco Polo the Venetian. Translation of Marsden revised by Thomas Wright. xxxix and 461 pp., Portrait of Marco Polo, Maps, 4 Appendices and Index. George Newnes, Limited, London, 1904.

In this edition of the standard translation of Marsden revised by Wright, their notes have been further revised, and a series of maps illustrating Marco Polo's travels, a list of contemporaneous events, and an exhaustive index have been added. It is a handsome and not an expensive volume, and may easily be carried in the pocket.

Through the Unknown Pamirs. By Lieut. O. Olufsen of the Danish Army. xxii and 229 pp., 58 Illustrations, 3 Maps and Index. William Heinemann, London, 1904.

This is a distinct contribution to our knowledge of the Pamirs. It is in no respect a narrative of travel. In his preface the author names the regions of the Pamirs that were the field of his studies. In the body of the book he scarcely alludes to his experiences, but reserves his pages for full descriptions of what he learned of the "Roof of the World" and its inhabitants during his two journeys in 1896–1899. Well equipped as Lieut. Olufsen is for geographical and anthropological investigations, his book is filled with new and valuable information, presented in a very readable form. The numerous photographs show a large variety of the aspects of the country and its inhabitants. Lieut. Olufsen's two expeditions covered the south Pamir from the territory around the River Gund and the Alichur Pamir to the Hindu Kush.

Per la Manciuria a Pechino. Salvatore Minocchi. 360 pp. and 58 Photographs. Libreria Bernardo Seeber, Florence, 1904. (Price, lire 4.)

An animated account by an Italian traveller of a recent rapid journey through Manchuria across the Great Wall and to Tientsin and Peking. His descriptions are lively, and many of them relate to districts that the war has brought prominently into view. He gives a long chapter to Harbin, "the Russian capital of Manchuria," devotes 70 pages to Mukden, and describes at length Port Arthur and the large Chinese cities he visited. The pictures are excellent.

BULLETIN

OF THE

AMERICAN GEOGRAPHICAL SOCIETY.

Vol. XXXVII 1905. No. 5

THE PHILIPPINE CENSUS.

BY

BY HENRY GANNETT.

The report of the census of the Philippine Islands, taken in March and April, 1902, has recently been issued. It consists of four octavo volumes, comprising three thousand pages, and is freely illustrated with statistical maps and diagrams, and with half-tone plates especially devoted to the peoples of the Archipelago.

The first volume of the report consists of a geographical description, the most noteworthy feature of which is that the Archipelago includes 3,141 islands, counting as a separate island every elevation above high water. It is probable that upon the completion of an accurate survey the number will be greatly increased. A table gives the names and areas of islands of more than one-tenth of a square mile in area.

The land area of the Archipelago is given as 115,026 square miles. The largest island is Luzon, with an area of 40,969 square miles. Mindanao is second in size, with 36,292 square miles.

The forest wealth is discussed, and, from a very rough estimate, it appears that the amount of standing timber exceeded 1,000 billion feet, B. M.—an amount more than double that of Oregon and Washington, and of far greater value per foot, since the wood is of species valuable for cabinet work and inside finishing. A table of altitudes is appended. An account is also given of the mineral resources, from which it appears that the possibilities in the way of mineral development are very great, especially in iron, coal, and copper.

The geographical description is followed by an account of the climate, written by Father José Algué, the well-known scientist, director of the Weather Bureau and of the Manila Observatory.

As to temperature, the year may be divided into three seasons—cool, wet, and dry, the first extending from November to March, the dry from March to June; while July, August, September, and October are the wet months. Upon the eastern Pacific coast the rainfall is almost incessant, being occasioned by the trade-winds. The western coasts are comparatively dry during the prevalence of trade-winds, but the southwest winds, or monsoons, produce a wet season in the parts of the Archipelago exposed to them—*i. e.*, from July to October.

The movement of the winds is seasonal, northeast trades prevailing from November to June, and southwest monsoons during the remainder of the year. During this period typhoons are very common, originating in the Pacific to the eastward and crossing the Archipelago in a westward course, which changes to northeast in the China Sea. The paper gives maps of rainfall and temperature, and wind roses and diagrams showing the course of the typhoons.

Following this is a paper by Father Masó, of the Manila Observatory, upon earthquakes and volcanoes.

Next comes the History of the Islands under Spanish Domination, by Pardo de Tavera, of the Philippine Commission, and finally a series of papers, partly historical and partly ethnological, upon the various tribes, the principal writer being Dr. D. P. Barrows, formerly chief of the Ethnological Bureau, and now Superintendent of Education.

With the exception of the Negritos, the original inhabitants, who still exist to the number of about twenty-three thousand, and the white and yellow immigrants, the people of the Philippine Islands consist entirely of Malays. The idea that certain of the wild peoples of Mindanao are of Indonesian origin is not accepted by Doctor Barrows; on the contrary, he finds the people very homogeneous. He classifies the civilized peoples into eight so-called tribes: the Tagalogs of central Luzon; the Ilocanos and Cagayans of northern Luzon; the Zambalans on the peninsula of Zambales; the Pampangans and Pangasinans of central Luzon; the Bicols of southern Luzon, and the Visayans, inhabiting the Visayan Islands and northern Mindanao.

The wild peoples have been grouped by various writers, notably by Blumentritt and the Jesuit fathers, into a large number of tribes. Doctor Barrows finds no such differences among them as would warrant this minute subdivision, but reduces the number to eighteen, and suggests that further study may decrease this number. The criterion of language is of little value in deciding this matter,

since there are few differences in the languages spoken by the various tribes, either Christian or wild, and these differences are of such varying degree that it is very difficult to say what degree of difference shall be regarded as constituting a tribe. The criterion of manners and customs and of physique is not of much value, since these characteristics do not vary greatly among the wild tribes. In the sense of organization there is no such thing as a tribe. With few exceptions, one village is like another. In a few cases only, and these among the Moros, does any organization beyond the village exist, and a *tribe*, in our meaning of it when speaking of our North American Indians, is unknown.

Doctor Barrows recognizes the Moros as a distinct people, the distinction resting on the fact that they are Mohammedans. For ethnological purposes he would divide the Moros into several groups, depending on their habits and degree of civilization. Nearly all the people of northern Luzon he throws into one group under the name of Igorotes, although this people have been subdivided into many tribes by other writers. The wild people of the interior of Mindanao, who appear under many names in the writings of the Jesuit fathers, he groups into half-a-dozen tribes, but with the pertinent suggestion that he sees very little difference among them, and may, upon further study, conclude to group them all together. These are the Subanos, Mandayas, Bagobos, Manobos, and others. The Negritos are sharply distinguished from the other peoples, except where the blood has been mixed; and it may be added that a large proportion of the Negritos contain Malay blood.

The manners and customs, the life, and the utensils of these peoples are described by men who have travelled and lived with them; for during the five years that the United States have had jurisdiction over the Archipelago, Americans have traversed the Islands from end to end, and there are but few nooks and corners into which they have not penetrated.

The history written by Pardo de Tavera cannot fail to be interesting and authoritative. The most salient feature in the domination of the Islands by the Spaniards was the part taken by the friars. It was not long after the pacification of the Archipelago in the sixteenth century that the people were apportioned in parishes to the Church Orders and their representatives, each having a parish in charge, and these representatives became not only the spiritual but the temporal guide and authority of that people. All matters, from salvation to the planting of rice, were under the control of the friar of the parish. He was priest and civil administrator and judge

as well, and to maintain his power he kept the people in ignorance, especially of the Spanish language, and by this means he became the sole go-between from the people to the Government. It was this domination which produced the opposition of the people to their spiritual advisers, and finally led to the insurrection. In pointing out these facts, however, it must not be overlooked that whatever degree of civilization and education these people acquired they received from the friars,and while they had many grievances against them, they had also much to be grateful for.

The total population of the Archipelago is 7,635,426, of which 6,987,686 are classed as civilized and 647,740 as wild, the criterion of civilization being Christianity. With the exception of the people of foreign birth, all the people are Catholics. Of the wild peoples, about two-fifths are Mohammedans and are grouped as Moros.

From the time the Filipinos were brought under the influence of the Catholic Church, the number of Christian inhabitants has been thoroughly well known; for each friar knew the number, sex, age, and conjugal condition of the members of his parish, and recorded every birth, marriage, and death, so that at any time it has been possible to state the total number of civilized inhabitants with a high degree of accuracy. The uncertainty regarding the total population of the Philippines has its origin in the utter ignorance of the number of the wild peoples, recent estimates ranging from seven to fourteen millions.

Censuses of the Christian peoples were made by the Spanish Government in 1877 and in 1887. These show the total number classified by sex only.

Selecting from among the estimates of population in past times such as appear to include the civilized people only, and which are probably complete, the rate of growth for the past century has been obtained. At the close of the eighteenth century the civilized population was about one and one-half millions; it is now but little short of seven millions. The average rate of increase in this time has been one and one-half per cent. per year, which is three-fourths the rate of growth in the United States at the present time, and a little more than half as great as the rate of growth in this country during the past century.

The only other Malay people of which we have a census is that of Java, and in that island the rate of growth during the past century has been more rapid than in the Philippine Archipelago. The increase among the Filipinos has not been uniform. It has been rapid for a period of years, followed by a reduction, owing to

the prevalence of some epidemic. In the past century the Islands have been visited many times by cholera, which, when it appears, wipes out in a few months the gain of several years. But notwithstanding these epidemics, on the whole the growth of population has been more rapid than in any European country excepting Russia and, possibly, Denmark.

The average density of population is 67 per square mile. The population is not, however, uniformly distributed, being grouped in villages near the coast. Of the entire number two-thirds live in towns bordering on the shore, and the greater part of those in the interior are found in the great valley of Luzon stretching from Manila up to Lingayen Gulf, and in the Cagayan Valley on the same island. In the most densely populated of the provinces, Ilocos Sur, there are 400 inhabitants to the square mile—about the same as in the State of Rhode Island. The island of Cebú is almost as densely settled. About one-half of the population of the entire Archipelago is found in Luzon. The great island of Mindanao, which is second in area, contains less than half a million people.

There is no classification into urban and rural peoples. The inhabitants are grouped in towns and villages, a scattered population being almost wanting. There are in the Philippines about 13,400 *barrios*, as the villages are called, ranging in size from Manila, with 220,000 inhabitants, to hamlets of a score or two of people. Nearly one-third of the entire number of villages has less than 200 inhabitants each, and no less than 85 per cent. have less than 1,000 each, and these villages of 1,000 or fewer inhabitants contain about three-fourths of the entire population of the Archipelago.

The great city is, of course, Manila, and it is to the Philippines what London is to England or Paris to France. There is no other town with one-tenth of its population, and there are but four with a population greater than 10,000, these being Laoag in Ilocos Norte, Iloilo, Cebú, and Nueva Cáceres, the largest of which has less than 20,000 inhabitants.

The civilized population is extremely homogeneous. No less than 99.2 per cent. were born in the islands. The Chinese number only 41,000, and form three-fourths of the foreign element. The people born in the United States number slightly over 8,000, and are second to the Chinese; while all other nationalities together contribute fewer than this country. Of all the foreign-born elements, about one-half of each nationality is found in Manila, the

remainder being scattered over the Archipelago. The foreign-born of Manila constitute a little more than one-eighth of the population of the city.

What has been said regarding birthplace is nearly duplicated by the facts concerning colour. Over 99 per cent. of the people are brown, six-tenths of one per cent. are yellow, and two-tenths of one per cent. are white.

The schedules classify the native population by tribes. Of the civilized people the Visayan is far the most numerous, comprising nearly one-half of the Christian inhabitants. The Tagalogs form a little more than one-fifth, and the Ilocanos about one-eighth. Of the wild peoples, the Moros constitute about two-fifths and the Igorotes about one-third.

There is in the report a map showing the locations of the different tribes, both civilized and wild. This map, prepared by plotting the census returns by towns and villages upon a large-scale map, shows with far greater certainty and definition than ever before the habitation of the different peoples. The tribes, as a rule, occupy compact areas, none of them, with a single exception, showing any tendency to migrate. The Ilocanos, who settled originally on the northwest coast of Luzon upon a narrow strip of land at the foot of a mountain range, have been forced by over-population to change their abode, and large settlements of them are now found in the Cagayan Valley and in parts of the great valley of Luzon, and even upon the Zambalan coast, at great distances from their original habitat.

The population is divided very nearly equally as to sex, the males being slightly in excess in the total population, while, if the brown people only be considered, the females are slightly more numerous.

The Filipinos are not long-lived. At the time of taking the census the average age was 23.9 years, which is 2.4 years less than the average age of the people of the United States and slightly greater than that of the negroes of this country. The proportion of children under one year of age was small, being slightly less than in the United States, but much greater than in Cuba. The disturbed condition of the Islands and the prevalence of cholera probably account for this small proportion. That of children under ten years of age, on the other hand, was large, being considerably greater than in the United States, and exceeded but slightly by Porto Rico. The proportion of people of extreme age was represented as being large; but investigation showed that in

nearly all cases the persons reported as eighty years old and over had exaggerated their ages, as is so often done by the ignorant.

Of the civilized population, 56.4 per cent. were reported as single, 33.1 per cent. as legally married, and 3.3 per cent. as consensually married, while the widowed constituted 7.2 per cent. The proportion of single was smaller than that of almost any country. The proportion of married was large, and if those consensually married be added it is very large, being exceeded in but few countries. The proportion of the widowed was very great, exceeding that of nearly every country. Two-thirds of the widowed were females, showing that in the Philippine Islands as elsewhere, widowers in taking a second partner choose maids rather than widows.

The question of literacy is one of great interest and importance. More than half, or 55 per cent., of the civilized people over ten years of age could neither read nor write, leaving 45 per cent. who could read, it being understood that this means in any language. As a matter of fact, by far the greater part of the literacy among these peoples is in the Malay tongues, since only a very small proportion of them could read Spanish. Those who were able to read may be divided into two classes: first, those who could read only; and second, those who could both read and write—and those of the latter class formed about one-fifth of the inhabitants ten years old and over. It is seen that of those who could read, less than half could also write, showing that education under the Spanish, which was carried on by the friars in great part, was limited to teaching the children to read. The proportion of inhabitants who could read and write is almost identical with that of Porto Rico.

Distributing the literates by sex, another interesting fact is developed. Of all males 47 per cent. could read, and of all females 42 per cent.; but when we consider the proportion able to read and write, it appears that 30 per cent. of the males were thus far educated, while only 10 per cent. of the females reached this degree of proficiency. In other words, it appears that while two-thirds of the males who were taught to read were also taught to write, only about one-fourth of the girls received an equal degree of education. In the United States, and even in Cuba and Porto Rico, the difference between the sexes in matters of elementary education is by no means as marked as in the Archipelago.

About one-fourth of the population consists of males of voting age. Of this class nearly one-third are able to read and write in some language, the vast majority, of course, in the Malay tongues only.

The occupations of the Filipinos are few in number, and present little variety. The people are essentially agricultural, the greater part devoting their time to farming. There is little co-operative work, little use for machinery, and still less of specialization of occupations. Most of the manufacturing is done by women in houses, with the simplest tools and appliances. Thus the beautiful cloths known as *jusi*, *piña*, and *sinamay*, are woven on hand looms, as cloth was woven in New England a century ago. In Manila there are a few large factories, including several for the making of cigars, one cotton mill, and several lumber mills, most of the lumber being sawed by hand with whip-saws.

A larger proportion of the population than in the United States or in Porto Rico are classed as wage-earners, being not less than 43.5 per cent. This large proportion is due to the great number of women workers. Classifying the wage-earners by sex, it is seen that of all males 57.6 per cent. are wage-earners, and of females 29.4 per cent. The proportion of the latter is two and one-half times that in the United States, and three times as great as in Cuba and Porto Rico.

Of the total wage-earners more than two-fifths are reported as engaged in agricultural pursuits. This exceeds the proportion in this country, but is less than that of Cuba. In domestic service the proportion is less than in Cuba, and only one-fifth that of the United States. The proportion engaged in trade and transportation is very small, while manufacturing pursuits include nearly one-third of all wage-earners. The proportion is larger than in this country, and more than double that of Cuba.

Turning to individual occupations, it appears that more than two-fifths are farmers or farm labourers, nearly one-fifth weavers and spinners, and about one-eighth day-labourers, 4.5 per cent. merchants, and 3.8 per cent. fishermen. These account for three-fourths of the wage-earning class.

The average Filipino family has 4.7 members, which is small for people in this stage of civilization, being equal to that of the United States in 1900, a little less than in Cuba, and decidedly less than in Porto Rico, in 1899. The small size of families is doubtless due to the ravages of cholera and the effects of recent insurrections.

The defective classes, including in that term the insane, blind, deaf, and deaf and dumb, are proportionately more numerous than in the United States. There are 220 insane in every 100,000 inhabitants, compared with 170 in this country. Of blind there

are 227 in each 100,000, which contrasts strongly with 81 in the United States. The deaf and dumb number 85 per 100,000, as compared with 66 in the United States, and of those who are deaf only there are no fewer than 332 in each 100,000 inhabitants.

Throughout the civilized communities there has been maintained an excellent registration of deaths. From all appearances it is, on the whole, as good as that of the registration area in the United States. Such a registration has been maintained by the Church for centuries under Spanish rule. Most of the early records have, however, been lost, but the Census Office succeeded in obtaining partial or complete records for the fifteen years between 1882 and 1897. For the census year, copies were made of the mortality records of the entire Archipelago. In addition to these, copies of the records for the year 1903 were also obtained. A study of the earlier records shows that under normal conditions, when no epidemic is present, the death-rate averages about 32 per 1,000 per year—a rate very near that of the negroes in this country. In 1902, however, the death-rate, owing mainly to the prevalence of cholera, ran up to the enormous figure of 63.3 per 1,000 inhabitants, or about double the normal. In 1903, when cholera was much less severe, the death-rate fell to 47.2 per 1,000—still, however, nearly 50 per cent. greater than the normal rate.

Among the males the death-rate was greater than among females. Among children it was very large. Of those under one year of age, it was 322 per 1,000—nearly double that of the same age in the registration area of the United States, 165, but considerably less than that of the negroes, 384. Among children under five years of age, the death-rate was 141 per 1,000, which contrasts strongly with the same class in the registration area of the United States, which was 52 per 1,000, and also exceeds the death-rate among the negroes of this country, 121. Among children under ten years of age, the death rate was 99 per 1,000. No less than 45 per cent. of the deaths in the Philippine Islands occurred under the age of ten years, as compared with 33 per cent. in the United States.

The greatest mortality occurs in the wet months, from July to October, and the least in the months of January, February, and March. Dividing the year into three seasons—the cool, warm, and wet—it appears that in the first there occurred 24.5 per cent. of the deaths of all the year; in the second period 28.4 per cent., and in the wet season there occurred 47.1 per cent., or nearly one-half of the total deaths. This excessive rate in the wet season is, however, in part a result of the cholera, which was at that time the most

severe, and which is not necessarily dependent upon the wet season, although affected to some extent by it.

The principal causes of death were cholera and malarial fevers, cholera being responsible for 31 per cent. and malarial fever for 27 per cent. of all the deaths in 1902. In that year tuberculosis of the lungs carried off 6 or 7 per cent., so-called epilepsy (which is more properly diagnosed as convulsions of children) caused more than 5 per cent. and dysentery and diarrhœal diseases account for 7 per cent.; smallpox between 3 and 4 per cent., *beriberi* (an anæmic disease unknown in this country) over 1 per cent., and other diseases in smaller proportion. Our most dreaded disease, pneumonia, is almost unknown in the Archipelago, and tuberculosis of the lungs, although it claims a few, is by no means serious. Bubonic plague, which in the previous year threatened to ravage the Islands, scarcely appeared in the death returns.

Cholera broke out in Manila in March, 1902. In eight months it had extended into every civilized province and into several military districts, spreading almost entirely over them. In seven provinces there was cholera in every pueblo, and in twenty-four others it appeared in a majority of the pueblos. During the year it claimed victims in 772, or more than three-fourths of the pueblos of the Archipelago. In Bataán the deaths from this cause for the year were 50 per 1,000; in Batangas, 40; in Ilocos Sur, 47; in Iloilo, 54, and in many municipalities the population was decimated by the disease.

Under the general title of "Education" the third volume contains papers by Señor Del Rosario on education during the Spanish régime and by Mr. Jernegan on the American public school system in the Archipelago. In the latter paper is included a history of the origin and development of the admirable public school system now maintained by the insular and local Governments.

The census schedules furnish a summary of the provisions for education as they existed at the time the census was taken, and of the extent to which the people have availed themselves of these privileges. The total number of schools was very nearly three thousand, of which 55 per cent. were public, a little over one-third were private, and the rest were religious schools, under control of the Church.

Of the total number of schools, 96.5 per cent. were of primary grade, and of this number 55.8 per cent. were public schools. Secondary schools were comparatively few in number, and the majority

of these were private or religious. Nearly all were day schools, those of a private character being very rare.

The total number of teachers was 5,925, of which the public schools employed not less than 62 per cent., and nine-tenths of all the teachers were in the primary grade. Of the total number, 82.7 per cent. were Filipinos, 13.2 per cent. were Americans, the remainder being Spanish and Chinese. As to sex, nearly two-thirds were men.

The number of pupils reported as attending school was 356,385, or about one-sixth of all the children of school age. This is a larger proportion than in Cuba, and almost as great as in Porto Rico. Three-fourths of these children were in the public schools, which fact is a convincing answer to the question asked by those who oppose the public school system. The teaching of English exclusively and these paration of the school from the Church are upheld in the Islands, as is shown by the fact that the parents of 75 per cent. of the children prefer that their children should attend public rather than religious or private schools.

Of the number attending school not less than 96 per cent. were in the primary grade. The schools were large, the average attendance per school being 120 pupils, the average teacher having charge of 60 children. These figures show the necessity of an increase in the number of schools and teachers. While in the United States the children are about equally divided as to sex, in the Philippines about three-fourths of the scholars were boys. It is a significant fact that of these school children the number who could use English was very nearly as great as that of those using the Spanish language.

The amount expended for schools during the school year ending in the spring of 1903 was about four million pesos, or, approximately, $1,750,000.

Pauperism is almost unknown. The wants of the people are few and easily supplied, and it is only in case of entire physical incapacity that any person is unable to provide himself with food and clothing. In such cases the unfortunate is usually cared for by his relatives, so that there are no almshouses. The total number of persons maintained, either in whole or in part, at public charge during 1902 was 1,668, or 24 per 100,000 of the population, which contrasts very strongly with 120 per 100,000 in the United States.

The number of persons convicted of crime during the same year was 12,312, and the number of such persons in confinement at

the close of the year was 5,395. This was less than 8 in each 10,000 inhabitants—a proportion less than in this country, where it was 13 to each 10,000 population. While comparisons concerning criminal statistics are extremely unsafe, this is certainly not a bad showing for the Philippines, especially when the unsettled conditions are considered.

All criminals sentenced for long periods are removed to Bilibid Prison, in the City of Manila. At the close of the year this prison contained 1,787 convicts. The principal crimes for which prisoners were incarcerated were murder, homicide and manslaughter, theft and robbery, and sedition.

Agriculture is the principal occupation. There are 815,453 farms, comprising an area of seven million acres, or twelve thousand square miles, which is about one-tenth of the area of the Archipelago. Of these seven million acres in farms slightly less than half were under cultivation.

The chief characteristic of the farming industry is the minute subdivision of land. The average farm covers only 8.57 acres, as contrasted with 147 acres in the United States. One-half the farms have an average area of 2½ acres, and more than one-fifth of them an average of only 1,000 square feet—the size of an ordinary city lot. The average cultivated area per farm is only four acres.

Of all the farms more than four-fifths are owned by the occupants, and nearly all of those occupied by tenants are rented for a share of the product.

The principal crops are hemp, tobacco, cocoa, sugar, coprá, rice, cotton, bananas, and sweet potatoes. A variety of fruits is raised, but not in large quantities; nor is the quality high, except in the case of mangoes. Philippine hemp, or *abacá*, is produced in all parts of the Archipelago where the rainfall is fairly continuous. It occurs both wild and under cultivation. Nearly all the crop is exported, and it is the chief article of export. Tobacco is raised mainly in northern Luzon, on the west coast, and in the valley of Cagayan River. Manila cigars are an important article of export to eastern Asia and Europe, but exports to the United States are small.

Sugar is raised in all parts of the Archipelago, but principally in the Visayan Islands. The islands of Panay and Negros contain many large plantations. Coprá, the dried meat of the cocoanut, is also an important article of export to Europe, where it is used in making cocoanut oil. Cotton is raised in limited quantities in northern Luzon, but nearly all the cotton goods used in the Islands

are imported. Bananas and sweet potatoes are grown everywhere, and form important elements of the native diet.

The following table shows in millions of kilograms the product of the above crops in 1902:

Tobacco	17.0
Hemp	66.7
Coprá	42.8
Rice	8.6
Sugar	180.2
Sweet potatoes	65.5

The principal farm animal is the caribao, or water buffalo. Other cattle, mainly from India, are used to a considerable extent. The native ponies are of small size, but are tough and willing, and are used for light draft. There are large numbers of swine, and pork is an important article of food.

The following table shows the numbers of live stock:

Caribaos	640,871
Other cattle	127,559
Native horses	142,992
Swine	1,179,371

It addition to the above there were a few Australian cattle and horses, and a few American horses and mules.

In Manila there are several large cigar factories which employ hundreds of workmen each. There is a large brewery and several small saw-mills. Aside from these, manufacturing is carried on in small establishments, with one, two, or half-a-dozen workmen, or by the women in their homes. The tables of the Census are restricted to establishments which produced in the census year (1902) a product valued at not less than five hundred pesos. All home manufacture was by this method excluded, and yet the entire textile manufacture, the manufacture of hats, mats, bags, etc., is thus carried on.

Under this definition there were 2,184 establishments, with an annual product valued at 35,000,000 pesos, or about fifteen million dollars. Chief among the products were cigars and cigarettes, with a value of 8,740,000 pesos; of liquors of various kinds, 2,478,000 pesos; food products, 2,228,000 pesos; and of lumber, 1,597,000 pesos.

Including branches of foreign banks, there were nine banking institutions in the Archipelago, all of which were located in Manila. Most of these have been established since the date of American

occupation. There were no local insurance companies, either fire, life, or marine, but 69 foreign companies have established agencies, mainly in Manila.

There is one railroad, which runs from Manila to Dagupan, a distance of 120 miles, with two or three small branches of trifling importance. It is a narrow-gauge road, and at the time of the census was owned by an English company. Other lines have been projected, and two of them are building. Aside from these railroads, inland commerce is carried on by boats wherever water transportation is possible.

But few of the rivers are navigable for vessels of any size. Even the Cagayan, one of the largest rivers, is navigable for small steam craft for a short distance only, and the tobacco crop of that valley is transported by *cascos* or by rafts to Aparri, at the mouth of the river.

There are but few good roads, and even these are practically impassable in the rainy season.

The country bordering on Laguna de Bay, however, is particularly well favoured in the matter of transportation, in the fact that the lake is everywhere navigable for *cascos*, and the Pasig River, connecting the lake with Manila, is navigable for this class of craft at all times.

The people live largely upon the coast, as has been noted elsewhere, and the inter-island commerce, carried on by small steamers, is very large, and centres principally in Manila.

There were only twelve public libraries, and these contained a little over four thousand books.

There were seventy hospitals, in which nearly twelve thousand patients were treated during the year. Most of these hospitals were established by the Philippine Government, owing to the prevalence of cholera and other diseases. Several excellent hospitals are also maintained by Church Orders.

The newspaper press is of little importance. There are forty-one newspapers and other periodicals published in various parts of the Archipelago, most of which are in English and Spanish, a few of them being in the native tongues. The total circulation of all is less than 70,000 copies, and more than two-thirds of the number are in the Spanish language. Notwithstanding this small circulation, about one periodical to a hundred persons, the reading of newspapers is rapidly increasing and the interest of the people in current events is becoming more widespread.

As stated elsewhere, the Christian people are almost entirely

Catholic, persons of other denominations being the white people scattered over the islands.

During the centuries of Spanish domination hundreds of fine stone churches were constructed, the value of which is very great.

The total number of churches of all denominations is 1,608, and their value 41,700,000 pesos. The capacity of these churches is more than 1,700,000 worshippers, or about one-fourth of the civilized population.

The estimated value in 1902 of all the property was 622,000,000 pesos, four-fifths of which was in real estate and one-fifth in personal property.

The taxes collected during the year 1902 amounted to a trifle over 10,000,000 pesos, the average rate of taxation being about 1.6 per cent. Notwithstanding the poverty of the people, there appeared to be little disposition to avoid the payment of taxes.

In the chapter devoted to Labor and Wages, towards the close of the fourth volume, valuable testimony is adduced to show that the popular opinion regarding the quality of Filipino labour is incorrect. The consensus of recent opinion is that the Filipino makes as good a labourer in most branches of work as the Chinaman, and that with good treatment and surroundings labour of good quality can be secured.

THE DEPRESSION OF SISTAN* IN EASTERN PERSIA.

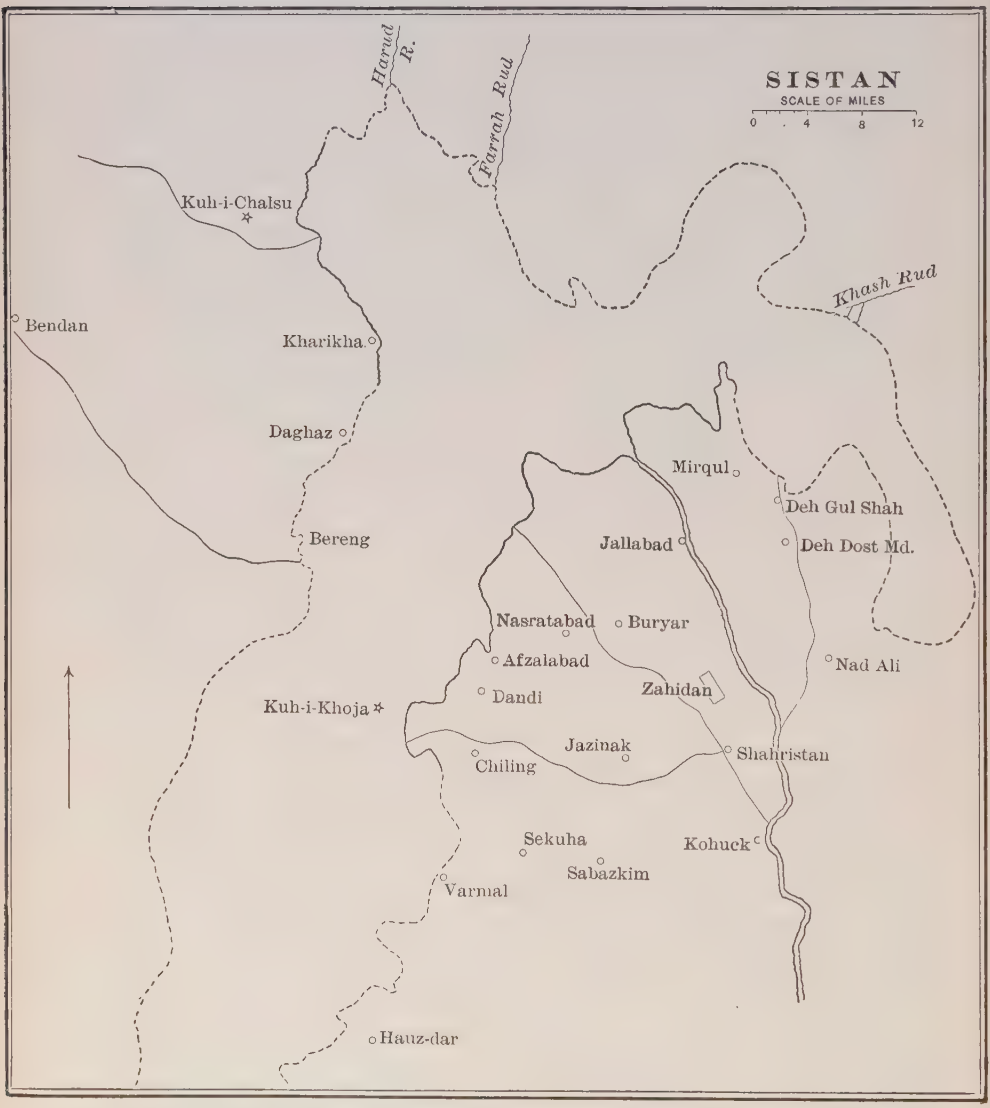
BY

ELLSWORTH HUNTINGTON.

Windy Sistan, once the proud home of Rustum, the Persian Hercules, is a poverty-stricken district near the distant corner where Afghanistan and Baluchistan join Persia. A variable lake and a swamp occupy the lowest portion of a mountain-girt basin five hundred miles in diameter; while adjacent to them on the east lies habitable Sistan. The lake is a shallow body of clear water, very slightly saline. Its size varies from almost nothing in times of drought to a diameter of sixty miles or more during floods. Both extremes are sometimes reached in a single year. The maximum depth does not exceed ten feet, according to the statements of the inhabitants of the shores, who pole their rafts to all parts.

* Mr. Huntington prefers this form to *Seistan.*

The swamp, which lies chiefly east and south of the lake, and is gradually encroaching far into it, consists of a dense growth of feathery-topped reeds from five to ten feet high. Outside the swamp comes the most important part of Sistan, an arable plain of



fine silt and clay left exposed by the withdrawal of the water during the gradual drying up of the lake. On the borders of what was formerly the lake-bed rises a rim of steep bluffs from fifty to four hundred feet high. Their level tops form the edge of a barren

plain, a desert of sand and gravel which completely encircles the inner, better-watered regions. To the west the desert, composed wholly of naked gravel, is only a few score miles in width; to the east, more sandy and silty, it stretches hundreds of miles, broken only by the narrow green depressions of the Helmund and other rivers. Lastly, outside the desert, rise the mountains, shutting their remote basin from the outer world. Those on the west and south are comparatively dry, and furnish no perennial stream; but on the north and east the perpetual snows of lofty Hindu Kush give rise to countless rushing brooks and rivers. Of all these only one, the Helmund, is always able to endure the aridity of the inner basin and reach Sistan perennially.

The varied zones of the basin of Sistan—namely, the lake, the swamp, the arable plain, the encircling desert, and the surrounding mountains—present physiographic types of the utmost diversity; it is to be expected that in response to such environment animate nature will present equally diverse autographic types. In a region of extreme aridity, such as Sistan, the relief of the earth's surface is the main factor in determining the presence or absence of water, and hence of life, both vegetable and animal. In the Sistan basin an abundant water supply is found on the edges among the high mountains, and in the centre, Sistan proper, which may be defined as the area anciently covered by the lake during its last notable expansion. In these two regions, therefore, life is abundant; while in the far greater area covered by the intervening desert it is very scarce.

The mountains west and south of Sistan lie one or two hundred miles from the lake. They reach heights of from five to ten thousand feet, and are covered with snow in winter. In early spring they produce a growth of short, sweet grass, excellent for sheep and camels. In summer, however, the grass dries up, the springs vanish, the running streams disappear or contract and become bitterly salt, and neither man nor beast can live. The human inhabitants of the region are of necessity nomads, dwelling in tents and journeying from place to place with their flocks. On the advent of a dry season they reluctantly leave the relative coolness of the mountains and migrate across the parched desert zone to the vicinity of the lake. Sistan is a fearful place in summer; but water abounds, and there are smooth plains of grain and grass to support man and beast. It is a "hell full of bread," as the people say; but that is better than the starving heaven of the mountains. Thus a considerable portion of the population of Sistan consists of nomad

Baluchis driven in by drought from the surrounding mountains and deserts. Some have settled in permanent villages as agriculturalists; but the majority wander from place to place, going to the cool mountains or the healthful desert whenever there is sufficient grass and water.

The other human inhabitants of Sistan are more permanent. Part of them, the Sistanis, are agriculturalists, inhabiting chiefly the delta of the Helmund River. The rest are a peculiar people, the so-called "Fowlers," or Sayads, who inhabit the swamp. Our habit of regarding deltas as smooth plains makes it seem almost absurd to speak of the relief of the delta of the Helmund as having a determining influence upon the conditions of life. Yet such is actually the case. To the eye the delta appears flat, but careful observation shows that, like others of its type, it consists of low, broad ridges, perhaps five or ten feet high and several miles broad, with corresponding hollows between. A main distributary of the river flows along a given radius, and during floods deposits silt, especially upon the inner portions of its flood-plain, until the stream flows on the top of a broad, smoothly-arched ridge, very flat, but very real. Then, during some flood, the stream breaks from its old course and follows a new radius, along which another ridge is built. The ridges of the Helmund delta can easily be detected, not by their relief, but by the character of their vegetation. They are dry and barren, with few plants except the prickly camel-thorn, a bushy weed with small reddish purple flowers. Villages are rare, and animals of any sort are almost absent. Sand-dunes abound, and are gradually encroaching over the whole area. The soil is rich and easily tilled; but most of it is now left unutilized, although abundant ruins show that this has not always been the case. The reason is not far to seek: the rainfall of Sistan is very light, and is limited to the winter months. Agriculture is utterly impossible without irrigation. It is an easy matter to lead water along the ridges in canals; but it does not pay, for the few feet of extra elevation raise the surface of the soil too far above the level of permanent underground water maintained by the lake. The roots of the plants cannot reach it. Hence more water is required for irrigation, and a drought is much more disastrous.

In the hollows the case is different. Where they are subject to flooding by the rivers in spring a dense jungle of tamarisks grows up to a height of twenty feet or more. It is frequently so dense as to be impassable, and furnishes splendid cover for unnumbered jackals, wild boars, and other smaller animals. The people realize

that water is close below the surface, and clear away the jungle for fields of millet, which grows luxuriantly along with the feathery young shoots of the quickly-sprouting tamarisk. Other hollows, not subject to inundation, are completely cleared and highly cultivated; and they, with the low-lying borders of the delta, are the places where grain grows best and men congregate most thickly. In winter and spring it seems as though the people of Sistan had chosen the most marshy, unhealthful, and impassably muddy portions of the delta for their villages; but they have merely done what sad experience has taught them to be essential—located themselves where the roots of their crops can reach a perennial water supply during the protracted dry season.

The irrigation system of Sistan is crude but, on the whole, effective. Every fall, when the Helmund River is at its lowest, the Persian Governor who controls most of the region calls out a large part of the male population. Tamarisks, cut in the jungle and bound into great bundles with their own branches, are brought on the backs of men or donkeys and piled into the diminished river at the head of the delta. Bundle is tied to bundle, and the whole is plastered with clay, forming a porous but fairly effectual dam. All through the planting season of winter and the vegetative season of early spring it diverts the water into a labyrinth of sluggish canals, which make travel a torture in the flat plain. Then, in May, comes the great flood from Hindu Kush and the flimsy dam is swept away. But the people do not care. The crops are almost grown, the remnants of the dam divert enough water into the canals for drinking purposes, and, when the time comes, the Governor will compel somebody—not them if they can help it—to build a new dam.

The flatness of the inhabited portion of Sistan causes the water to spread over very wide areas whenever the fields are irrigated. This, added to the depth of the canals and the slipperiness of the clayey soil, makes travelling well-nigh impossible in winter—a state of affairs which might be avoided if the aridity of the country did not compel the location of villages in the flattest, dampest places. The people are so accustomed to mud and water that even in freezing weather they wade unconcernedly through canals and rivers or through the water standing on roads and fields, and suffer fearfully from rheumatic complaints in consequence. Where a canal is too deep to be easily forded primitive bridges are constructed. As wood is very scarce, dry, bushy camel-thorn is thrown into the sluggish water and packed down until a firm but very porous dam is formed. A foot or two of clay is spread upon the camel-thorn

and a dry road is constructed. Such a bridge is easy to cross and does not greatly check the slow flow of the water. Often the flimsy structures are so strong that even horses and camels can cross them, although if the path is very narrow difficulties ensue. One of my camels slipped off the path and fell with his front feet hanging over a bridge upstream and his hind feet downstream. We were obliged to dig away not merely the bridge but part of the bank of the canal—a performance which the people seemed to regard as quite commonplace. In one case I saw a very broad bridge, which not only furnished an excellent pathway but carried one canal directly across another.

In addition to the muddy roads and flimsy bridges the aridity of Sistan produces other strange results. For instance, during the floods of the spring of 1904, a number of people were drowned because the water had been so low the previous winter. At that time the Helmund actually became dry. Fortunately, water could be obtained easily by digging wells, and no one suffered from thirst. The easiest places to dig wells were in the deep beds of the streams, for there the water was only a few feet below the surface. The most accessible parts of the stream-beds were at the fords, directly in the course of the everyday paths. So there the careless Sistanis dug their wells; and, when the water was high the next spring, walked into them and were drowned.

The lake and swamp of Sistan support more abundant life than do the plains. The vegetation is chiefly reeds and the low grass on which the Baluchi nomads feed their cattle. Among animals shell-fish and fish were formerly abundant, but are now scarce, having perished in great numbers during the almost complete drying up of the lake in 1871 and again in 1903. Insects and small animals of various sorts are abundant, as is evident when the swamp-men burn off the reeds for the sake of their cattle. The first fires that we saw appeared as immense columns of black smoke thirty miles away. Later, close at hand, we saw the fluffy heads of the reeds blazing up suddenly with a red flash and a sharp crackle almost like an explosion. The air in front of the flames was full of ravens, kites, crows, hawks, and other birds, which pounced now and again on the hapless little beasts and insects driven from their homes by the advancing heat. Behind the fire, where the ground had become cool, other birds were picking up the insects killed by the flames. The birds of Sistan are innumerable. During January we saw the water dark with thousands of them—coots, ducks, geese, pelicans, plovers, sand-pipers, grebes, swans, and others.

Early in February they were beginning to leave, presumably on their way to the lakes of northern Europe or Siberia.

The strangest dwellers in the swamp are the people, the ancient race of Sayads, or Fowlers. They are of the purest Persian stock, and appear to have preserved the same mode of life unchanged for ages. Their houses are made of reed-matting, their cowsheds of bundles of reeds, their heavy canoe-shaped rafts of more tightly-tied bundles of reeds, their fuel is reeds, and the food for their small, humped cattle is reeds. In fact, their whole life has adapted itself to an environment of reeds and swamp. When the Government sends for taxes they are said to know how to lose themselves and their cattle in the swamp as if by magic. If a stranger builds a raft upon the lake they attempt to destroy it by night, for they claim the water and all that pertains to it as theirs. Most of all, the birds are theirs. Each winter evening, in the sunset glow, a fleet sets forth from every village; men in blue or brown, with sturdy, naked limbs, stand on their golden rafts and pole them out over the gray-blue water to the fringe of yellow reeds. Nets are stretched on sticks half overhanging the water, and the men hide themselves in the rushes. A duck, a coot, or a swan, swimming under a net, strikes it unwittingly; the Fowler pulls a string, the net falls, and the bird is entangled. The Sayads own fields of grain in many places, but their chief source of livelihood is swamp-fed cattle and swamp-caught birds.

Three types of men live in Sistan—the nomad Baluchis, the agricultural Sistanis, and the swamp-haunting Sayads. The Baluchi is a nomad because his mountains and deserts cannot support him permanently in one place. Therefore he wanders with his flocks, and makes his tent of easily-obtained portable cloth of goats' hair. Being compelled by drought to come to Sistan, he is in part losing the nomadic habit and settling in villages. The Sistani is a settled tiller of the soil, because in no other way can a large population exist in Sistan. He uses the dry camel-thorn for fuel because it is nearer at hand than the tamarisk of the jungle, and he needs no fire except to cook his bread. He builds his house of mud, with a domed roof without a particle of wood, because good, stiff clay for sun-dried bricks is abundant, while wood large enough to serve as timber is almost unknown. Yet his brother of the same race, who lives in the jungle, builds his house of interwoven tamarisk boughs wattled with mud. The jungle man is also agricultural, but he moves from place to place every few years. It is easy to build a new house of his flimsy variety, and it is as hard in one place as

in another to keep the tamarisks out of his fields. The Sayad once more is a nomad, because his humped cattle must be driven to new reed-beds; but he need not move far, for fodder is easily procurable in large quantities. Young reeds grow fast when the ground has been burned over, and old reeds are so large that cattle eat them slowly. Nor does he need to carry his house and stable with him, for if there are plenty of reeds a day's work will make a new house. Moreover, he cannot migrate far, for he must be near his fields on the outer edge of the swamp, and he must be where he can always go for waterfowl on the inner edge.

The wind, like the other physiographic features of Sistan, has a marked influence upon life. During three months of the summer a remarkably constant wind blows night and day with great violence from the north-northwest. It seems to be the northward continuation of the trade-winds deflected to the west by the prevailing trend of the mountains. It is said to blow at a rate of over sixty miles an hour for days at a time without intermission. Its violence is such that the air is thick with flying sand; and huge sand-dunes are formed or blown away with almost the rapidity of snowdrifts. At Chil Pir, near the great ruins of Zahidan, I saw a sacred shrine located on the borders of the dune area, but entirely free from sand. A few months earlier, when the place was visited by Colonel MacMahon, of the Sistan Arbitration Commission, it was completely covered with sand, which—so the natives say—was blown away in three days after the summer wind began to blow. No trees, except the tamarisk, can flourish in Sistan unless carefully protected from the wind. On the northwest border of the region, however, where the gorge of Bendun affords a shelter from the wind, fine palm-groves are the main support of the villagers. Even low-growing plants are influenced by the monotonously fierce gales. The vine of the wild watermelon, a bitterly acrid little fruit, most delicately striped with green and yellow, does not spread in all directions, according to its normal habit, but is blown into a tangled, closely-packed rope of stems extending south-southeast from the root and so uniformly oriented that it might serve as a compass.

In spite of its disadvantages, the wind is of use to the people of Sistan. It grinds their grain and makes life livable in summer. In the houses of the rich extra doorways are built in the north wall. In winter they are walled up with sun-dried bricks of mud; in summer they are opened and stuffed with brush. A servant standing outside throws water upon this. The wind whistling through is cooled by evaporation, so that, although the outside temperature

may be over a hundred degrees, the interior sometimes becomes too cool for comfort—until the servant falls asleep and the burning blast sweeps in uncooled. When the wind dies down for a day or two the extreme heat is as nothing compared to the plague of the countless mosquitoes bred in the swamp.

Sistan deserves to be called a hell. A fly, like the tsetse of Africa, kills the horses; the dogs die of a peculiar epidemic which leaves the survivors blind; the camels are subject to two virulent contagious diseases. During January, 1903, the transport camels of the British Arbitration Commission were dying of influenza at the rate of from twenty to fifty a day. As we approached the camel camp groups of villagers appeared—one with camel-leg slung on his donkey, another with a rib over his shoulder, and a third with a liver on his back. At the camp scores of men were waiting for the suffering camels to die, when they hauled them out of the compound with ropes and chopped them to pieces with axes. The poor Sistanis get so little except bread and melons to eat that any flesh is a boon. They ate every part of the diseased camels except the bones and skin.

Yet Sistan is rich in possibilities. Even under the present oppressive conditions of government it exports large quantities of grain. It is a prize for which four nations are struggling. England and Russia desire influence; Persia and Afghanistan desire actual possession. In both cases the struggle is a geographic response to the peculiar character of Sistan as a fertile depression in the midst of a desert. Russia wants her influence to be supreme, because Sistan is the only promising half-way house on the most feasible line of railway from Transcaspia to the Indian Ocean. England, in the same way, wishes to be paramount, because Sistan is the only half-way house from India to western Persia. On every side stretch deserts, a month's caravan journey in width. In the middle Sistan furnishes a resting-place, with abundant water and supplies. The power that holds it has a priceless military advantage over its rival.

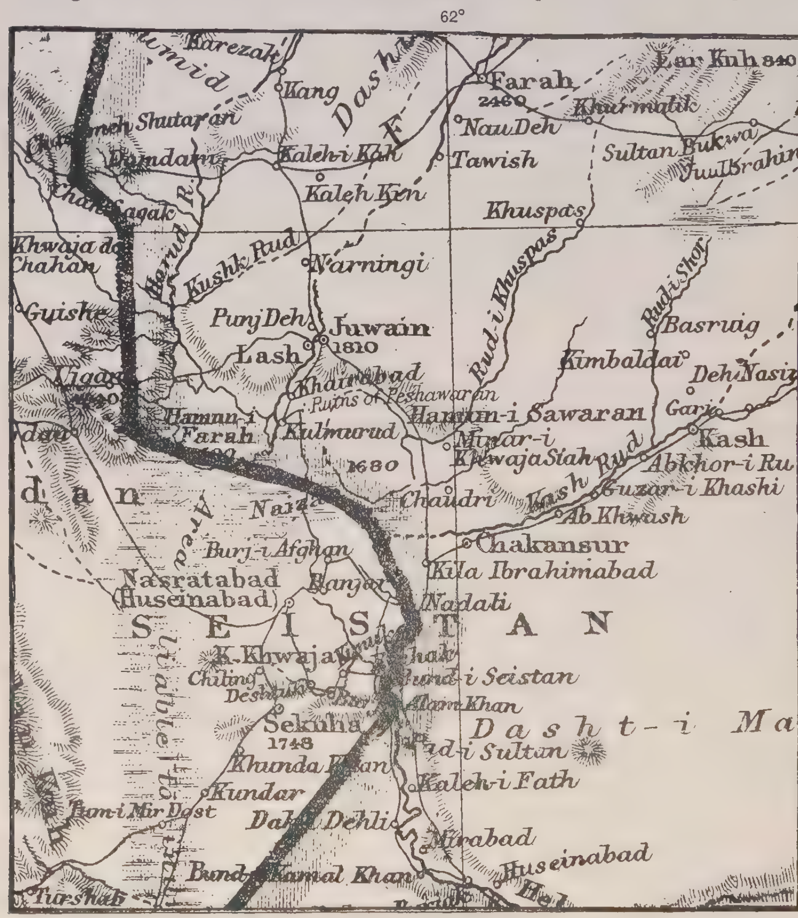
To-day Sistan is divided between Persia and Afghanistan in defiance of physiographic facts, and hence there is a continued and often sanguinary struggle. The water supply comes wholly from the Afghan mountains, and the easiest line of approach is across Afghanistan down the main rivers. The strip of desert west of Sistan offers a natural boundary between Afghanistan and Persia. In a few places it is narrow and easily crossed; elsewhere it forms an almost ideal international barrier. An Afghan caravan which had

crossed the desert north of Sistan in search of salt related that four or five men had died of hunger.

"Had the rest of you no bread?" we asked.

"Yes, but we feared that if we gave it to our friends we ourselves might suffer. That is the rule of the desert; each man for himself."

A desert whose horrors engender such heartlessness would seem to be an effectual barrier between nations. While the boundary between Persia and Afghanistan defies geography and passes through Sistan the two nations cannot be expected to live at peace.



Thus far we have considered a few of the many ways in which the physiography of Sistan influences the life of to-day. A complete study of the geography of the region must include also the influence of physiography upon life in the past. Tradition, historical record, and the distribution of ruins unite with the freshness of the aban-

doned lake bluffs in suggesting that within historical times the water supply of Sistan was greater than now. One or two thousand, or even five hundred years ago, this region, which is now so poverty-stricken, was most prosperous. According to Lord Curzon, the number of ruins in Sistan is probably greater than in any equal area in any part of the world. The former population must have been far more dense, and at the same time more prosperous than that of to-day. It seems probable that the decrease in the water supply, on the one hand, and the impoverishment and diminution of the people on the other, bear the geographic relation of cause and effect.

THE TERRESTRIAL MAGNETIC WORK OF THE UNITED STATES COAST AND GEODETIC SURVEY.

BY

G. W. LITTLEHALES.

A retrospective glance at the beginnings and the growth of knowledge in terrestrial magnetism will heighten our appreciation of the important advancements that are being made in this branch of geophysics by the United States Coast and Geodetic Survey. Since, as a system of organized knowledge, terrestrial magnetism presupposes and requires centuries of observations, it has not long been entered in the hierarchy of the physical sciences, but has nevertheless made gratifying progress under the exceptional administration that has been bestowed upon the subject in the magnetic survey of the United States.

In comparison with the age of many of the other earth-sciences, it is singular to find that, even if it be admitted that a knowledge of the misdirection of the magnetic needle from the true north and south direction existed more than four centuries ago, it was reserved to Christopher Columbus to discover, during his voyage of discovery to the New World, that the declination was not everywhere the same, but that in one part of the Atlantic Ocean the compass needle pointed to the east of north, and in another part to the west of north; and that it was no longer ago than the year 1634 when Gellibrand, a Professor of Mathematics at Gresham College, in England, found that the declination at any certain place does not remain the same, but suffers a perpetual fluctuation with the course of time. The world waited for a realization that the magnetic needle, when freely

suspended, inclines or dips below the horizon, until Norman, a practical seaman and instrument-maker, made his experiments in the year 1576, and, besides discovering the magnetic inclination, published the surmise that the magnetic directing-force has its seat within the earth, and not in the heavens, as had been previously supposed. Gauss, of Göttingen, established the substantial truth of this surmise by analytical methods with the aid of accumulated observations of the values of the terrestrial magnetic elements, and in 1838 announced that the earth's permanent magnetism is derived almost entirely from sources within its own crust. This eminent mathematician and astronomer was among the first of those profound and subtle thinkers in terrestrial magnetism to go beyond the Empiricist School, in which the ruling idea was the treatment by arrangement of great masses of observations, and to pass on into the field now characterized by the writings of Dr. Bauer as published in his International Journal of Terrestrial Magnetism and Atmospheric Electricity, in which the work of the mind becomes a preponderating element in the constitution of the knowledge of the causes and manifestations of the earth's magnetic state.

About the year 1840 the discussion of observations of the direction of the magnetic needle and of the intensity of the earth's magnetic force became a feature of the work of the United States Coast Survey. The late Professor Schott had charge of these investigations for nearly half a century, and under his guidance a study was made of the diurnal variation of the declination in its various phases for different localities in North America. The secular change of the directional elements of the magnetic needle also received his attention, and he made a comprehensive and systematic collection of the magnetic observations taken in the United States and adjacent countries to serve the Survey as a basis for the solution of problems relating to the secular change of the earth's magnetism. Acting under the enlightened advice of Dr. Henry Pritchett, Congress increased the appropriation of money largely above what had previously been made for magnetic work in the Coast and Geodetic Survey, and so, in 1899, made it practicable to organize a Division of Terrestrial Magnetism and to secure the able leadership of Dr. Bauer in the conduct of the magnetic survey of the United States. This organization has established magnetic observatories in the eastern and western parts of the United States, in Alaska, in Hawaii, and in Porto Rico; has collected together a large material equipment; and is now carrying on its work under highly improved and efficient methods. At the end of the first five

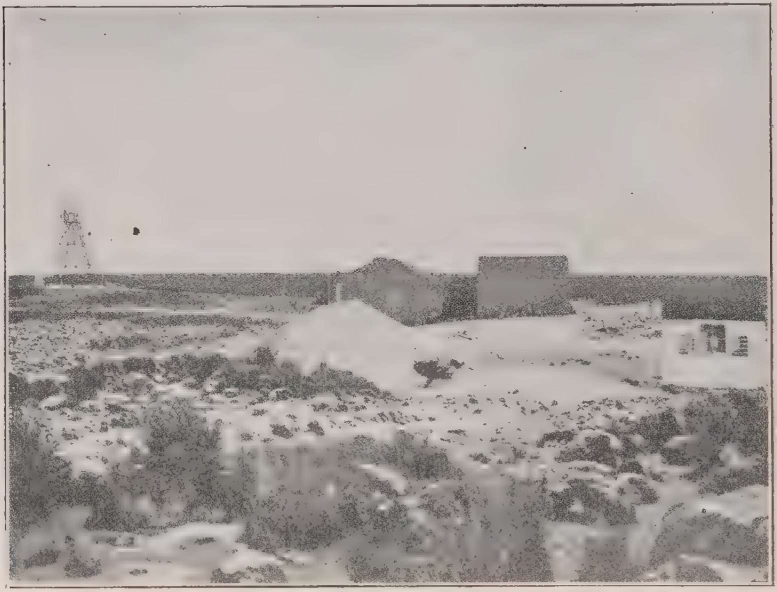
years of its existence, its operations in the United States and the countries under the jurisdiction of the United States have resulted in the survey of an area equal to one-third of that of Europe, and in making of observations for magnetic declination, inclination, and intensity at 1,636 stations, including a large number which had been previously occupied for magnetic observations and which were reoccupied with the object of providing data for the investigation of the secular change.

The results obtained by the Survey, supplemented by the results of surveys made by some of the State Governments, together with other information, enabled the U. S. Coast and Geodetic Survey to construct a chart depicting the lines of equal magnetic declination and of equal annual change in the United States for the epoch 1902. These lines also extend through Mexico and the Gulf of Mexico, and through Cuba, Jamaica, and other parts of the West Indies. One of the distinctive features of this chart is a system of "lines of equal annual change." The rate of change of the lines of equal magnetic declination being shown graphically, the future charts of this type will show *the change of the annual change*, which will be useful in the study of the secular change. Besides its useful bearing upon multifarious practical affairs of every-day life, and its value to students of geology and other branches of geophysics, the chart serves the purpose of navigators in ascertaining the correct direction of the magnetic meridian along the Atlantic and Pacific coasts of the United States and in the Gulf of Mexico and the Great Lakes. Future editions of this publication will be enhanced in value by the multiplying observations that will become available as the magnetic survey proceeds, and also by the recent commendable inauguration of a system of terrestrial magnetic observations at sea by the vessels of the Coast and Geodetic Survey.

When the extent of the magnetic observations of the Coast and Geodetic Survey is considered in connection with the intended magnetic survey of the North Pacific, which has been provided for under the direction of Dr. Bauer by the Carnegie Institution of Washington, it will appear that the terrestrial magnetic surveying work of the United States is already assured to embrace nearly one-fourth of the earth's surface, and that it may, with the possible extension by the Carnegie Institution of the surveying work to the other great oceans, ultimately cover more than three-fourths of the earth's surface.

AN ARGENTINE OBSERVATORY AND SOME PATAGONIAN LAKES.

Captain H. L. Crosthwait, R.E., has a paper (*Geographical Journal*, March, 1905) on his journey to Lake San Martin, Patagonia, in connection with the demarcation of the Chile-Argentina boundary. Before landing in Patagonia his party made a short trip through the channels of Tierra del Fuego, and the first place touched at was New Year Island, situated in Lat. 54° 59′ S. at the south end of South America, about five miles off the north coast of Staten Island. The object was to visit the Magnetic and Meteorological Observatory established there by the Argentine Government



MAGNETIC AND METEOROLOGICAL OBSERVATORY, NEW YEAR ISLAND.

as a base observatory, in connection with the Antarctic expedition then in progress under Dr. Nordenskiöld.

We reproduce here from the *Geographical Journal* a view of this observatory. Captain Crosthwait speaks of it as complete in every respect:

It is superintended by four Argentine naval officers, who, in the interests of science, exile themselves to this lonely and desolate spot. The attention they give to their work is well illustrated by the fact that they never allow the annual range of temperature in the magnetic observatory to exceed 1° C. The following temperature conditions have been recorded on this island, as given me by the officer in charge, since the observatory was opened in February, 1902. Highest record, 55° Fahr.; lowest, 16° Fahr.; annual mean, 41° Fahr. The magnetic observatory is kept at an almost constant temperature of 64° Fahr.

Staten Island was just visible through mist, and the writer says that an intense gloom beyond all description seems to overhang this place, which makes it look like the confines of the world. He speaks of Cape Horn as a "famous but very ordinary promontory."

A very striking feature of Beagle Channel in Tierra del Fuego is the astonishing number and variety of glaciers which occupy all the valleys descending from every mountain high enough to be covered with a mantle of perpetual snow. The valleys are sheltered from the summer sun, which accounts, in part, for the great extension of the glaciers. The coolness of the summer, rather than the severity of the winter, is also an important factor in maintaining both the glaciers and the comparatively low snow-line, which cannot be much more than 2,000 feet above sea-level. These are the main factors in the explanation of this glacier region. Most of the large glaciers, however, show signs of shrinkage.

Entering Patagonia, the party started for Lake San Martin, one of the lakes in the Cordilleras that, with their environment, were little known previous to the boundary surveys. On the way to San Martin the party visited lakes Argentino and Viedma, south of it. Viedma sends its waters to Argentino, which has an outlet to the Atlantic through the Santa Cruz River. Lake Argentino is a splendid sheet of water, 60 miles long and 10 to 20 broad, its western end having several long, narrow arms penetrating deep into the recesses of the Cordilleras, where they receive the waters of numerous glaciers. Large icebergs were found floating on the lake. All these lakes are fed by glaciers.

The physical geography of Lake San Martin region is especially significant. This lake, unlike Viedma and Argentino, has an exit into the Pacific. At the east end of the valley there is a shallow lake called Laguna Tar:

> At present its waters flow into Lake San Martin, *i. e.*, in a westerly direction. The continental water-divide is here so ill defined that a cutting of a few feet would cause Laguna Tar to flow to the Atlantic. There is the dry bed of a stream visible, and in time of flood this lake may, temporarily, have an exit in both directions. The continental water-divide would then run through a lake. A water-divide, therefore, without precise knowledge, may prove a very inexact definition for a boundary.

Captain Crosthwait says that San Martin undoubtedly occupies what was once a strait joining the Atlantic and the Pacific. The main body of water runs almost east and west, penetrating into the heart of the Cordillera. The mountains rise abruptly from its shores. It is subject to the most violent storms, which make the lake very rough and dangerous to navigate. The rocks around San Martin are mostly basalt. In many instances the basalt is cellular,

indicating that it had flowed under water. The geological sequence of events here seems to have been somewhat as follows:

A submerged land, when the sites of the great lakes were arms of the sea, such as we now find in Tierra del Fuego; volcanic activity, when lava flowed under water, as shown by the existing cellular basalt; elevation of the land, for we find numerous instances of upraised beaches with cellular basalt overlying them; following this, another period of volcanic action, and then an age of ice, for there is very marked evidence of ice-action on the basalt. In the present glaciers we have the lineal descendants of a glacial period.

The writer says that Patagonia is a fine field for the traveller who wishes to explore unknown glaciers and study glacial action. The climate, in summer, though cool, is very healthful.

GEOGRAPHICAL RECORD.

AMERICAN GEOGRAPHICAL SOCIETY.

Transactions of the Society, April, 1905.—A Regular Meeting of the Society was held at Mendelssohn Hall, No. 119 West Fortieth Street, on Tuesday, April 18, 1905, at 8.30 o'clock P.M.

Vice-President Moore in the chair.

The following persons, recommended by the Council, were elected Fellows:

Benjamin J. Macdonald.	Samuel N. Hoyt.
Percival Lowell.	Luis Enrique Bonilla.
Frederick W. Frankland.	W. A. Peck.
Charles E. Morrison.	William W. Pennell.
William D. Mount.	Arthur Blair Moody.
Amos Lawrence Mason.	Charles Franklin Rand.
Henry C. Swords.	C. W. Parks.
Charles H. Reckefus, Jr.	

The Chairman then introduced Professor E. L. Stevenson, who addressed the Society on The World as seen through the Eyes of Mediæval Map-makers. Stereopticon views were shown.

On motion, the Society adjourned.

AMERICA.

The Geographical Society of Philadelphia.—The growth of membership of this Society during the past two years has been very gratifying. After May 1 an initiation fee of \$5 will be charged in addition to the annual fee of \$5. The Society and its library are now commodiously housed at 1520 Chestnut Street, and the library is constantly growing. Professor Heilprin gave a course of six lectures on current geographic topics in April. The Society has two regular meetings each month from November to May inclusive, besides special courses of lectures; its autumn and spring excursions are attractive features.

Evaporation in the United States.—The problem of accurate and comparable observations of evaporation has always been one of the most unsatisfactory subdivisions of meteorology. Evaporation depends upon so many different factors, and the difficulty of agreement upon some standard evaporimeter is so great that, so far, absolute values of the amount of water evaporated have not been obtainable.

Even when a free-water service under sunshine is taken as the basis of measurement, the results remain unsatisfactory, for the reason that the amount of evaporation depends upon the depth, extent, and temperature of the body of water, as well as upon many other local conditions. In the *Monthly Weather Review* for December, 1904, there appears a paper on *Evaporation Observations in the United States*, by H. H. Kimball, of the U. S. Weather Bureau, which was read before the National Irrigation Congress at El Paso, in November last. The usual method of determining evaporation by deducting the run-off from the rainfall over a watershed, and attributing the difference to evaporation, is unsatisfactory, for, as a practical problem in irrigation, evaporation from water surfaces is of more importance than that from land surfaces. In *Water Supply and Irrigation Papers, No. 80*, of the U. S. Geological Survey, Mr. George W. Rafter computed the evaporation for twelve drainage basins in the Eastern United States by this method; but the engineer must consider the question of losses in the case of storage basins of considerable area, and if these are situated in a dry region, the loss may amount to 30 to 50 per cent. of the amount of water stored.

Between the years 1876 and 1886, Mr. Desmond Fitzgerald carried out a very exhaustive series of evaporation experiments in connection with the reservoirs of the Boston, Mass., waterworks, and the results were set forth in the *Transactions of the American Society of Civil Engineers*, Vol. 15, September, 1886, pp. 581–646. These investigations related not only to actual measurements of evaporation by means of tanks floating on the surfaces of the reservoirs, but also to the relation between the rate of evaporation and the temperature of the water surface, the air temperature, the humidity, and the wind movement. The rate of evaporation was found to depend upon (1) the vapour pressure corresponding to the temperature of the water surface; (2) the vapour pressure corresponding to the dew-point of the atmosphere, and (3) the wind velocity. Professor L. G. Carpenter, at Fort Collins, Colorado, has, since 1887, carried on a series of evaporation measurements in the case of water in a tank three feet cube, the top being flush with the surface of the ground (Ann. Repts. Agric. Exp. Sta., Fort Collins, Colo.). The formula obtained agrees remarkably closely with that of Fitzgerald. There is a difference in the value of the co-efficient of the wind velocity (W.), which is attributed by Professor Carpenter to the fact that the velocity at Boston was measured at the water surface, and at Fort Collins it was obtained from an anemometer on the roof of a building.

In 1887–1888, Professor Russell, of the U. S. Signal Service (*Monthly Weather Review*, 1888, p. 235), investigated the rate of evaporation in standard thermometer shelters by means of Piche evaporimeters, in which evaporation takes place from the moist surface of a porous paper. A formula was obtained, and the monthly evaporation at 140 Signal Service stations was computed from July, 1887, to June, 1888, inclusive, on the basis of the monthly mean wet-bulb and dew-point temperatures derived from the tri-daily observations. A chart was then drawn, showing lines of equal annual depth of evaporation in inches from a free-water surface. Professor Russell's formula does not include the wind velocity term of the Fitzgerald and Carpenter formulas, the equation representing the evaporation with a wind velocity outside the shelter of 7.1 miles per hour, which was the mean velocity at the stations where the Piche observations were made in June, 1887.

The author of the paper in the *Monthly Weather Review* for December, 1904, above referred to, holds that this wind velocity does not apply to all parts of the United States for all seasons, and that for this, and other reasons, Professor Russell's formula does not rest upon as sound a physical basis as do the formulas of Fitzgerald and Carpenter. For the purpose of checking Professor Russell's computed

values, the following comparison is made by Mr. Kimball, the measurements of evaporation given in the second series having been made at stations near those given in Professor Russell's series. While the results are not strictly comparable, since the stations are not in all cases identical, and in some cases the reservoirs are at a greater altitude than the Weather Bureau stations, they are noteworthy. The results computed by formula are generally higher. Mr. Kimball points out that Russell's equation, deduced from tri-daily observations, is not applicable to the present 8 A. M. and 8 P. M. observations unless a correction is applied, and believes that the formulas of Fitzgerald and Carpenter have a general application if the temperature of the water surface, the dew-point, and the wind velocity are known.

ANNUAL EVAPORATION.

Russell's Formula.		Surface Measurements.		
STATIONS.	EVAPORATION.	STATIONS.	EVAPORATION.	EXPOSURE.
	(inches.)		(inches.)	
Boston, Mass	34.4	Boston, Mass	34.78	Beacon Hill Reservoir.
		" "	39.11	Chestnut Hill Reservoir, floating pan.
New York, N. Y	40.6	New York, N. Y	39.64	Croton Reservoir, floating pan.
Cheyenne, Wyo	76.5	Laramie, Wyo	46.30	Ground.
		Fort Collins, Col	46.16	"
		" " "	59.50	Computed for Reservoir.
El Paso, Tex	82.0	Fort Bliss, Tex	82.65	Floating pan.
Salt Lake City, Utah	74.4	Fort Douglas, Utah	42.46	" "
Fort Grant, Ariz	101.2	Tucson, Ariz	75.78	" "
Prescott, Ariz	56.0	Tempe, Ariz	65.00	" "
Sacramento, Cal	54.3	Clear Lake, Cal	32.38	" "
		" " "	33.40	Ground.
Fresno, Cal	65.8	Kingsbury Bridge, Cal	47.79	Floating pan.
		" " "	59.49	Ground.
Los Angeles, Cal	37.2	Arrowhead Reservoir	36.60	" (Elev. 5,160 ft.)
San Diego, Cal	37.5	Sweetwater "	57.55	Floating pan.

R. DEC. W.

THE FREE ZONE OF MEXICO.—Many who do not know why a "Free Zone" was established in Mexico may be interested in the following explanation condensed from *Commercial Mexico in 1905*, issued by our Bureau of Statistics: The Free Zone is a strip 20 kilometers (12½ miles) wide, extending along the northern border of Mexico from the Gulf to the Pacific. It is not quite free, because goods entering it from the United States have to pay 11½ per cent. of the Mexican tariff. If the goods are transported across the Free Zone to other parts of Mexico they have to pay the full tariff charge.

When the Rio Grande became the boundary between the United States and Mexico, in 1848, the conditions on the two banks of the river differed widely from one another. In the United States there were no taxes on internal commerce, and the tariff charges were low. In Mexico the tariff was very high, and each State imposed duties on goods entering from other States. The result was that goods in the border Mexican towns cost two to four times as much as in the Texas towns across the river.

This caused immigration into the United States to such an extent that the neighbouring part of Mexico was likely to be turned into a desert. The final result was that the Mexican Government established the Free Zone along the entire border, so that the Mexicans living there might be placed on about the same footing, as to the prices of commodities, as their neighbours over the line. Conditions have since altered so much that the Free Zone is no longer regarded as a necessity, and some day it may be abolished.

Agriculture in the West Indies.—Sir Daniel Morris, in his presidential address before the Fifth Congress of West Indian Agriculturists, held at Port-of-Spain, Trinidad, in January, gave interesting information concerning the changes now in progress in the economic conditions of the islands. On the whole, sugar is still the backbone of the industries, though in some islands it is now of little importance. Trinidad has turned from sugar to cacao, and is now exporting this product to the value of about $5,000,000 a year. The cacao crop is growing elsewhere, and the annual exports from Grenada are valued at about $1,000,000, and from Jamaica at $400,000. The cultivation of cotton is increasing, and Liverpool is paying good prices for the fibre. The export of fruit in many of the islands is now greater than the sales of sugar, and the trade in tobacco, rubber, Sisal hemp, and fish is growing. On the whole, the islands are recovering from the misfortunes due to the great fall in the price of sugar.

Meteorology of the Great Lakes, 1904. The Meteorological Chart of the Great Lakes, No. 2, 1904, presents a summary of the meteorological conditions of the lake region during the season of navigation of 1904. The severity of the winter, and the unusually heavy accumulation of ice, prevented inter-lake navigation from becoming general until after the stormy period of spring had passed. The winter snowfall was heavy, and the greater part of the snow, especially in the northern districts, was preserved and was fed slowly into the lakes during the late spring and summer months; the stage of water on all the lakes, during the navigation season, being higher than any experienced for a number of years, except in the case of Lake Superior. The number of vessels totally lost through stress of weather was twenty. The loss due to fog was $218,000; and the total loss due to weather conditions was $467,425 less than during the previous season. Thirty-two lives were lost through stormy weather, this being a reduction of seventeen below the figures for 1903.

R. DeC. W.

Rainfall on the Coast of Chile in 1903.—A comparison between the rainfall during the year 1903 at Iquique and at Puerto Ancud, on the coast of Chile, brings out very clearly the difference between the desert region in the north, beyond the reach of the prevailing westerly winds, and the southern latitudes, where rain falls throughout the year. The contrast is similar to that found on the western coast of the North American continent, between Lower California and southern Alaska, or the coast of Washington. At Iquique (lat. 20° 12′ S.) 0.59 inch of rain fell, on one day, in July (midwinter). At Puerto Ancud (lat. 41° 41′ S.) the rainfall by months, and the distribution by days, was as follows :—

Month.	Amount (inches).	Days.
Jan.	3.23	14
Feb.	3.66	12
Mar.	6.89	18
Apr.	10.08	17
May	8.42	21
June	13.39	25
July	8.70	19
Aug.	10.63	23
Sept.	10.75	24
Oct.	3.66	13
Nov.	3.50	14
Dec.	6.93	13
Year	89.84	213

R. DeC. W.

The Argentine Antarctic Meteorological Station at Scotia Bay, South Orkneys.—Reference has lately been made in these *Notes* to the meteorological station at Scotia Bay, South Orkneys, which was originally established by the Scottish Antarctic Expedition, and has now been taken over by the Argentine Government. The *Scottish Geographical Magazine* for April, 1905, contains an account of the first year's work at this important station under Argentine auspices. During 1904 the lowest temperature occurred on August 3 and 4, with a minimum of $-40°$ F., and a mean on the latter day of $-33°$ F. In 1903 the minimum was $-26°$. A phenomenally high temperature of 46.8° was recorded on May 31, 1903, during a *foehn* wind, and a similar occurrence on August 28, 1904, gave a temperature of 40.0°. A heavy thunderstorm occurred in August, and another in October, this being an unusual occurrence. In 1903 the most severe gales came from N. W. to S. W., but in 1904 at least three severe gales came from S. E. The weather in 1904 was very different from that in 1903, being more severe, but fine for longer periods at a time. The contrast was probably due to the difference in the position of the pack-ice.

R. DeC. W.

AFRICA.

Salt in Africa.—Between Senegal and the Central African lakes and between the Sahara and the Zambezi is an extensive region, too distant from the sea to supply itself with salt by evaporating sea-water; and as it has no salt deposits, the inhabitants rely, to an important extent, upon two plants—one a variety of the *arum* family, and the other a species of bamboo, which they dry and burn and then leach the ashes, using the residuum as we use salt, which it somewhat resembles in taste. The coast people of West Africa buy annually about 40,000 tons of salt that is shipped from Liverpool and is obtained chiefly from the salt district of Norwich, England. A few thousand tons of German salt are also sent to West Africa.

This European salt, however, is not available for trade more than about 130 miles inland, because the heat and humidity reduce it to a liquid state. It deteriorates in the storehouses on the coast, and even more during transportation. It is not European salt, therefore, that supplies the vast inland region from the Sahara to the Zambezi. Practically the sole source is the salt of the Sahara, which fills a part of the demand.

The product is put up in the form of bars of an average weight of 25 to 30 kilograms, each piece being about a metre in length, 30 centimeters wide, and from 5 to 8 centimeters thick. It is crude and dirty, and other substances mingled with it colour the salt red, black, or gray. But it has the great advantage over the imported articles that it is solid and withstands humidity. It is carried south from 1,000 to 1,200 miles without detriment.

The cost rapidly increases with the length of the journey. At Timbuktu it is sold at 1 franc a kilogram; at 2 francs on the Upper Niger; at 4 francs on the Congo; and more is paid south of that river. The commodity is inadequate in quantity, and every middleman has his profit. There are three regions of the Sahara which produce salt.

If European salt can be put up in such a way as to withstand the climate, there will be great profit in its exportation to inner Africa. The British have tried the experiment, but thus far have not succeeded in producing salt bars that are proof against tropical humidity. On the other hand, a French company, "La Société marseillaise du Sel aggloméré," is producing bar salt, in which, according to the *Revue des Deux Mondes*, the salt is compressed to half its original contents, is smooth

and glistening, and extremely hard. It is asserted that this salt bar withstands the climatic conditions. It is now being sent into the French colonies.

It is estimated that foreign salt which will retain its quality may be sold annually to the amount of 1,000,000 tons in inner Africa. The natives would welcome it as a great boon. (Condensed from Dr. C. Müller's "Die Salzversorgung Zentralafrikas," in the *Deutsche Rund. für Geog. und Stat.*, Vol. 27, No. 5.)

THE MARQUIS DE SEGONZAC IN CAPTIVITY.—In November last the Comité du Maroc of Paris sent the Marquis de Segonzac back to Morocco with Mr. Gentil, lecturer on geology at the Sorbonne, and Mr. R. de Flotte-Roquevaire (whose large map of Morocco is well known), as assistants, to engage in exploration in the southwestern part of Morocco. In April the news came that de Segonzac had been denounced by one of his guides as a Christian, and betrayed into the hands of the Seketana Berbers. The party arrived late last year at Mogador, the Atlantic seaport nearest to their field of work.

The tribes of the interior were in revolt against the Sultan, which greatly increased the danger of travel. It was decided to be unwise to work together, and so they divided the field. Gentil was assigned to study the geology of the City of Morocco and its environs and the Sus region; de Flotte-Roquevaire was to triangulate a district in the Great Atlas between Mogador and the City of Morocco, and de Segonzac was to explore a part of the southern slope of the Great Atlas and locate the hydrographic centres from which issue a number of the streams of that region.

Gentil and de Flotte-Roquevaire completed their work and returned to Mogador to await their leader. He wrote on Feb. 4 that he had explored the central part of the Great Atlas, had secured the material needed to map it, and had connected his new work with that which he had done in 1901. He intended to start for the coast in a few days. It is supposed that he is being held by his captors for a ransom.

This young and ardent explorer between 1899 and 1901 made a number of venturesome journeys, always in disguise; but in spite of the obstacles in his way he brought to France a harvest of scientific results in the form of route surveys, astronomical observations, ethnological notes and botanical and geological collections, which attracted much attention.

SENSIBLE TEMPERATURES ON THE CONGO.—In the BULLETIN for March, 1904 (Vol. XXXVI, pp. 129–138), reference was made to the various suggestions regarding the best method of expressing the temperatures which the human body feels under varying conditions of air temperature, moisture, wind velocity, exposure to direct insolation, and so on. It was there pointed out that the so-called "sensible temperature" is the complex resultant of many variables, and is so complex and so individual that no simple expression can be found for it. Nevertheless, various scales of sensible temperatures have been suggested, as, for example, those of Abbe, Osborne, Lancaster, and others; and we should doubtless gain much in our understanding of the physiological effects of various climates if we had, in addition to the ordinary records of meteorological elements, some tabulation of the feelings of comfort or discomfort experienced by the human body.

It is interesting to note, in this connection, that in a recent publication of the *Société Belge d'Astronomie* (*Bulletin*, No. 11, 1904, *La Chaleur au Congo*), prepared by J. Vincent, meteorologist at the Royal Observatory of Belgium, there is a tabulation and discussion of observed "sensible temperatures," recorded on the following

scale, originally proposed in the *Annuaire* of the Royal Observatory of Brussels for 1890:

Très chaud........	Sueur abondante, malaise.
Chaud............	Sueur; on est peu ou point incommodé par la chaleur.
Tiède.............	Sensation de chaleur sans sueur.
Tempéré..........	Etat indifférent. On s'assied en plein air sans pardessus.
Frais..............	Sensation de froid non désagréable aux mains. On ne a'assied plus en plein air sans pardessus.
Froid.............	Sensation de froid désagréable aux mains.
Tres froid.........	Sensation de froid insupportable aux mains; désagréable au visage.

These observations were made at Kisantu, at the mission of the Jesuit Fathers, and began December 14, 1903. They form part of the third series of meteorological observations taken in the Congo region at the instance of and by means of instruments given by the *Société Belge d'Astronomie.* The second series, taken at Tchimbane by Mons. A. Balat, contained the first systematic record from the Congo country of "sensible temperatures" (published in the *Bulletin* of the Société, Vols. 7 and 8). Among 169 noon observations made at Kisantu there were the following numbers according to the above scale: 8 *frais;* 48 *tempéré;* 82 *tiède;* 29 *chaud;* 2 très *chaud.* These observations were made in the shade, as they should have been. M. Vincent points out, in his comments on these records, that the evidence which they bring regarding the climatological, or sensible, temperature, is not unfavourable to the Congo district, and criticizes some statements previously made by Lancaster regarding the discomfort experienced there by reason of the high temperature and relative humidity (*Le Climat du Congo*, Brussels, p. 19). In regard to these criticisms, it may here be noted that, as was above suggested, individuals vary so much, for obvious reasons, regarding their feeling of heat or cold, and comfort or discomfort, that a careful comparison of "sensible temperature" observations, even when these have been carefully made according to a fairly well-defined scale, is hardly worth while. Doubtless many of the accounts of Congo climatic discomforts may have been somewhat exaggerated. Doubtless, also, no one but Brother Molitor himself, the observer at Kisantu, would have had just the sensations of heat and cold above tabulated. R. DeC. W.

Ancient Ruins in Rhodesia.—Mr. Richard N. Hall, who has given eight years to the study of the ancient monuments in southern Rhodesia, says (*Geog. Jour.*, April, 1905) that none of the hundreds of ruins has been more than partially explored. Many important ruins have been seen only by casual travellers, and the work of unearthing only a part of the Great Zimbabwe area would be more than the labour of a lifetime. Still, researches have made great progress in the past few years. There are in Rhodesia no less than 300 distinct ruins and groups of ruins. Only a few scores of these are entitled to rank as "ancient." The larger part of them probably does not date back of the thirteenth, fourteenth and fifteenth centuries.

There is overwhelming evidence at the Great Zimbabwe of the ancient civilization and arts possessed by the builders of the earliest period. The Zimbabwe temple is the finest and most intact example of a Nature-worshipping shrine known to the world. Its construction points unmistakably to some knowledge of geometry and astronomy on the part of the builders. It is quite certain that even the cruder methods at Zimbabwe of applying this knowledge, which was common to the

ancient Semitic peoples, were imported from the near East and did not originate in Southeast Africa. The right ascension of the sun, the heliacal rising and the meridian passages of stars, are believed to have been noted at Zimbabwe. These ancient builders were also past masters in the science of military defence, the walls showing that the builders were military strategists of the highest order. Their gold ornaments, finely designed and engraved, could not have been the work of an uncivilized people; and the hundreds of ancient gold mines show that they were skilled in metallurgy and picked out rich shoots, patches, and pockets with marvellous cleverness. It is estimated that from these widespread mines they extracted $375,000,000 of gold.

ASIA.

Album of Philippine Types.—The volume with this title, published last year at Manila by the Philippine Government, contains 160 photographs of 80 men who were in Bilibid prison in 1903. This large penitentiary contains about 3,000 men. The persons whose photographs were taken were selected as fairly typical of the populations from which they came. Most of them are from the tribes officially denominated as Christian—the Tagalog, Visayan, Bicol, Cagayan, etc.; but the non-Christian tribes, including the Moro and the Negrito, are represented. Complete anthropological measurements are given for each of the subjects, and the introduction contains further particulars concerning the men photographed and estimates as to the value of each subject as typical of his tribe.

OCEANIA.

Exploration in New Guinea.—Mr. A. E. Pratt, who recently returned to England from a two-years' expedition in the remote interior of British New Guinea, chiefly along the Owen Stanley Range, has sailed on a new scientific expedition, which is expected to last for two and a half years. Mr. Pratt, accompanied by his two sons, proceeded direct to Batavia, where he will make final arrangements for his journey. After conferring with the Dutch Government officials he will cross to Dobo, the chief town of the Aru Islands, a group very little known to Europeans. After making collections there, the expedition will cross to Dutch New Guinea, and will immediately strike into the interior, with the object of reaching the highest possible point of the Charles Louis range, a snow region running east and west and never yet explored. Valuable geographical results are expected, and a map will be made, but the special work of the expedition will be the collecting of natural history specimens.

POLAR.

The French Antarctic Expedition.—Further details of the work of Dr. Charcot's expedition have been received. Dr. Charcot reported by telegraph (*La Géog.*, Feb., 1905) that the *Français* wintered at Wandel Island, at the southern extremity of Gerlache (formerly Belgica) Strait, in 65° S. Lat. The *Uruguay*, in its search for the party, went within twenty miles of these winter quarters. The party succeeded in settling the question of Bismarck Strait by sending an expedition through it, proving its connection with the more eastern Sea. The strait was discovered by the German Dallman, in 1874, at the western end, and it has since been a question whether it was really a strait, cutting off the northern part of the Graham Land Peninsula, or only a fiord penetrating some way into the land.

The party also laid down the shore-line of a part of the unexplored west coast of Graham Land for a considerable distance to the south, and landings were made at

several points. It also explored the Palmer Archipelago, the islands separated by Gerlache Strait from the mainland. Impenetrable ice-pack prevented the explorers from reaching Alexander I. Land, though they came within sight of it. The *Français* ran aground on the Graham Land coast, but the serious leak resulting was fortunately repaired. Considerable additions to our knowledge of this region appear to have been made by Dr. Charcot's thirteen months' sojourn in the Antarctic.

ANOTHER ARCTIC ENTERPRISE.—It is reported that the Duc d'Orléans has organized a north polar expedition with which he will leave Norway early in May, accompanied by Capt. Gerlache, who commanded the Belgian Antarctic expedition. The party will proceed to Franz Josef Land, where an attempt may be made to push northward by means of a new channel. The object is not to reach the North Pole, but to make a further study of the archipelago. The Duke does not anticipate wintering in the Arctic, though his ship will be provisioned for that possible event. Besides the Norwegian crew the party will include a number of French scientific men. As the season appears to be early this year, it is thought that there will not be much difficulty in reaching Franz Josef Land.

COMMERCIAL GEOGRAPHY.

THE RAILROAD FROM ORENBURG TO TASHKENT.—In September last the Russians completed the railroad from Orenburg, a city on the eastern frontier of European Russia to Tashkent, the most important centre of commerce in Russian Central Asia. The line is 1,100 miles long. It is now the shortest and most direct route between Russia and Central Asia, and it will considerably diminish the importance of the Trans-Caspian railroad, as it will no longer be necessary to make the great detour to Caucasia and across the Caspian Sea in order to reach the heart of Central Asia. The road will also promote the development of civilization along the great valley of the Syr Daria. Large works for the accumulation and storage of water supplies are now in progress. Along some stretches of the road, water is in inadequate supply, and the deficiency is being remedied at great expense.

THE CAPE TO CAIRO RAILROAD.—According to the latest information, good progress is being made with the extension northward from the Victoria Falls of the Cape to Cairo railroad. It is expected that the railhead will be at Kalomo, the administrative centre of northwest Rhodesia (Barotseland) by June. The further extension of the line for 250 miles beyond Kalomo will be made by the Mashonaland Railroad Company, which is operating the line from Bulawayo northward. The terminus of the new extension at Broken Hill will be reached early next year. There will then be continuous railroad communication from Cape Town, a total distance of some 2,000 miles, to within 100 miles of the southeast corner of the Congo Free State. On the Victoria Falls—Kalomo section—50 miles of earthworks are finished and over 25 miles of rail laid.

THE MOST ELEVATED POINT ON THE RAILROAD AROUND THE CONGO CATARACTS.—The Congo Free State has chnnged the name of Sona Gongo, a station on the line from Matadi to Stanley Pool, to Thysville, in honour of Colonel Thys, under whose charge this railroad was built. The station is half way between Matadi and Stanley Pool, among the Crystal Mountains, at an elevation of 741 meters. It is one of the highest points in the Congo basin, 717 meters above Matadi, the starting-point, and 457 meters higher than Leopoldville, the terminus of the road. Trains on this road do not move in the dark, and all of them stop for the night at Thysville, making

the entire journey in the daylight of two days. The railroad company is now building a hospital for whites and another for blacks at this station, which seems to be a favourable location for the future sanatorium of the Congo State.—(*Le Mouve. Géog.*, No. 8, 1905).

TOBACCO IN SOUTHERN RHODESIA.—The Agricultural Department of Southern Rhodesia, where no white man dared to set his foot a quarter of a century ago, has become convinced that the country offers superior facilities for the cultivation of tobacco. In order to acquire helpful information, Mr. George M. Odlum, a member of the staff, was sent to this country last year to study the industry in all its phases. The result of his work, published by the British South Africa Company, now appears in a handsome volume of 200 pages, under the title "The Culture of Tobacco." It is devoted to our tobacco soils, our methods of planting and cultivation, and the curing and marketing of the crop. A finer manual of the kind would be hard to find. Scores of half-tone pictures adorn the book, including photographs of tobacco fields in Southern Rhodesia, showing the crop in all stages of growth, and proving, at least, that it thrives vigorously there. It is asserted that this region is an ideal tobacco country. This is the latest illustration of the energy and push that are transforming Southern Rhodesia. White farmers are tilling the soil, and reapers and steam-diggers are busy where a few years ago native women were the only agriculturists.

EXPANSION OF CROP AREAS.—No result of the study of ecology is more valuable than the discovery and use of new fields adapted to the growth of plants of economic value. A few illustrations of this branch of geographic research from recent Consular Reports will show the importance of the study:

BANANAS—COLOMBIA.—The cultivation of this tropical fruit is being extended along the Gulf of Uraba, and also near Santa Marta, where the conditions of soil, sunshine, and rainfall have been found to be specially adapted. Already the earlier plantings have come to fruition, and the quality of the product augurs well for the industry. Local markets are excellent, and American markets, also, should furnish a good outlet for export.

Experiments in banana culture, first for coffee shade and now for export fruit, have given promising results in Mexico. The plant desires moderate upland not too near the sea, much sunshine and rain, and a clay soil. These conditions have been found in a belt of varying width near the coast in the States of Vera Cruz and Tabasco. Where transportation permits plantations are being set with slips. A possible manufacture of various products from the banana in the more inaccessible regions also promises the extension of its cultivation.

RAMIE—SOUTHERN STATES.—It has been insisted that our Southern States are especially adapted to the growth of this fibre plant. In the face of the growing European demand for the raw material, further study and experiments might give us another southern crop. A further suggestion of this kind which is being contemplated is the introduction of rubber culture into the Philippines to supply our market. This is urged because the soil, climate, and labour conditions are as well adapted to its production in these islands as in Borneo, Java, Ceylon, Sumatra, and the Malay Peninsula, where there is much activity in rubber culture.

COFFEE—QUEENSLAND.—Recently many studies to extend coffee culture have been made. Suitable conditions, barring some one element, have been found in many places, but few successful experiments have been made. A native coffee in several

parts of tropical Africa promises well, but real introduction, based on knowledge of geographic conditions, is, perhaps, best illustrated in Queensland, Australia. A fair local market has developed in the continent. The moderate upland soils and the climate, in the northern part, especially favour this crop.

Henequen—Queensland.—This fibre, so valuable for binding-twine, cord, rope, etc., has been sought to occupy a warm, semi-arid, stony, hilly region, now producing little of value. Its introduction from Yucatan, where it is rapidly enriching the people, is the result of a careful study of conditions in both countries, and the success of the venture seems assured. The market in the grain districts of Victoria is large, and the foreign market is not glutted. Owing to its keeping qualities, it can be grown in the interior, whence transportation to the ports is long and hard, and yet come to market in good order.

Cotton Abroad.—In 1900, 75–80 per cent of the world's cotton crop of about 7,000,000,000 pounds came from the United States, but cotton is grown in many tropical and sub-tropical countries. The increasing demand for it, and the increasing desire of nations to grow their own raw products, have stimulated investigation in cotton culture to a great extent. It seems that in many parts of Africa the industry finds specially suitable conditions. Labour is usually to be had; soil, rainfall, drainage, and long seasons are provided. Transportation is the great drawback. In the German East African cotton-growing districts not only are railroads being built to move the crop, but an automobile service to bring the product from plantation to railroad is being installed.

Cotton-growing is being introduced into Colombia at two or three points, and is being rapidly extended, where conditions permit, in the departments of Magdalena and Bolivar. It is estimated that there are in Colombia about 3,000,000 acres adapted to Colombian long-stapled cotton, comparable with that of Sea-Island cotton.

In China much of the best cotton-producing land is more profitable for growing food than cotton, and most of the cotton produced is of an inferior quality. China as a market seems assured, because her use of cotton goods is growing rapidly.

G. D. H.

GENERAL.

Dr. Klotz's Astronomical Stations.—Dr. Otto Klotz, Government Astronomer of Canada, has arranged with the Harvard Observatory for a station to perfect his series of longitude observations, for which the completion of the British trans-Pacific cable offered a fine opportunity. Beginning at Ottawa, he and his party made longitude connections with Fanning Island, the Fiji Islands, Norfolk Island, Queensland and Sydney, N. S. W., where his series of connections met a like series eastward to Sydney. This was the first circuit of the world made in work of this character.

At each of the stations a pier of cement or brick is erected, the longitude of which is determined by time differences, shown by telegraph with the utmost possible accuracy. Such a pier is to be erected at Harvard, so that Dr. Klotz may connect the Canadian trans-continental longitude series with the American series; ultimately a similar connection will be established between Vancouver and Seattle.

Meteorology at the University of Wisconsin.—The University of Wisconsin will, next year, give instruction in meteorology under Mr. James L. Bartlett, observer at the University station of the U. S. Weather Bureau.

Geography in Oxford during 1904.—The attendance at the School of Geography in Oxford was, in the Hilary term, 117; Easter term, 141; Michaelmas term, 146. The attendance of women was from 7 to 23. The total attendance was nearly double that of 1902. Lectures were delivered by Dr. Mackinder on the historical geography of Europe and of the British Isles; by Dr. Dickson, on the climatic regions of the globe; by Dr. Herbertson, on systematic and regional geography; by Dr. Grundy, on the strategic geography of Greece; and by Mr. Beazley, on the history of geography. The attendance was at times too large for the lecture-rooms. The reference library is constantly growing, and the collection of maps of Central Europe on a scale of at least 1:200,000, and of the British Isles, on a scale of 1:126,720, will soon be completed as far as they exist. The Committee welcomes contributions to the collections of the School.

Royal Geographical Society Medals for 1905.—The Founder's Medal has been awarded to Sir Martin Conway for his various mountain explorations and work among the glaciers and mountains of Spitsbergen; the Patron's Medal to Captain C. H. D. Ryder for important results while acting as chief survey officer on the recent Tibetan mission; the Victoria Research Medal to Mr. J. G. Bartholomew for great contributions to the progress of cartography; the Murchison Grant to Mr. William Wallace for geographical work in the Protectorate of Northern Nigeria; the Gill Memorial to Col. F. R. Maunsell for explorations in Asia Minor; the Cuthbert Peek Grant to Mr. F. J. Lewis for contributions to knowledge of botanical distribution by researches in the north of England; and the Back Grant to Capt. Philip Maud for survey work on the south border of Abyssinia.

Travels of French Students.—In three years (1898–1900), Mr. Albert Kahn gave 75,000 francs to pay the expenses of five young men in each year, or fifteen in all, on journeys to different parts of the world. He desired to give to students who had completed their university course, and intended to be teachers in the higher schools, an opportunity to supplement their theoretical training with practical knowledge of various countries and peoples. The only condition he imposed was that the travelling students should be conversant with the English language. They were free to select their routes of travel and to dispose of the allotted year as they pleased.

The confidence he reposed in these young men seems to be fully justified by the book "Autour du Monde par les Boursiers de Voyage de l'Université de Paris," which has just been published. Thirteen of the fifteen students contribute to the book, two having been unavoidably prevented. They sum up the results of their observations in Palestine, Burma, Java, French Indo-China, Japan, the Philippines, America, India, New Zealand, and other of the French and British colonies. They have benefited by the generous and novel idea of Mr. Kahn, and the results of their studies in many parts of the world will not fail to be useful in their educational work.

Mineral Production of Canada in 1904.—The Canadian Government Trade Enquiry Branch has issued a preliminary summary of the mineral production of the Dominion for 1904, from which it appears that the value of the metallic production was $31,222,525, a falling off of about $2,250,000 from 1903. This decrease appears to be due, not to an unfavourable condition of the metal industries, but to the subsidence of the inflation, occasioned by the rapid exploitation of the more easily accessible Yukon placers. The gold yield was worth $16,400,000—a decline of about $2,400,000 from 1903. The value of the other metallic products was: Copper,

$5,510,119; iron ore exports, 401,738 tons; pig-iron from Canadian ore, $901,880; lead, $1,637,420; nickel, $4,219,153; silver, $2,127,859; zinc, $24,356.

Among the non-metallic products were, coal, $14,599,090; coke, $1,884,219; asbestos, $1,167,238; and petroleum, $984,310. The total value of the mineral products was $60,343,165.

DEATH OF PROFESSOR ADOLF BASTIAN.—Dr. Bastian, Director of the Berlin Museum für Völkerkunde, is dead in his eightieth year. In spite of his advanced age he was at the time of his death engaged on a scientific journey in Trinidad. Among the many scientlfic books of which he was the author "Die Völker des östlichen Asien" and "Die Kulturländer des alten Amerika" were especially conspicuous.

DER NATURWISSENSCHAFTLICHE VEREIN FÜR SCHLESWIG-HOLSTEIN, of Kiel, will celebrate its fiftieth anniversary by a festival on the 17th and 18th of June, 1905.

On the 17th, there will be an inspection of the Natural History collections of the University, and visits to the ships of war, and the dock yards, and a social reunion will be held in the evening at the Seebadéanstalt.

On the 18th of June, after a morning session in the University, and a luncheon, there will be an excursion on the Kiel Inlet.

Those who desire to attend the celebration are requested to send in their names by the 1st of June.

U. S. BOARD ON GEOGRAPHIC NAMES. DECISIONS, APRIL 5, AND MAY 3, 1905. CHINESE PROVINCES:

ANHUI; (Not Nganhwei, Ngan-hwei, Ngan-hoei, Ngan-hui, Ngan-hwuy, nor Ngan-Hwuy.)

CHEHKIANG; (Not Cheh-kiang, Chekiang, nor Che-kiang.)

* CHIHLI; (Not Pechili, Pe-chili, Pe-chi-li, Chih-li nor Chi-li.)

* FUHKIEN; (Not Fukien, Fu-kien, Fuh-kien, nor Foo-kien.)

HONAN; (Not Ho-nan.)

HSIN CHIANG; (Not Eastern Turkestan, nor Kashgaria.)

HUNAN; (Not Hu-nan nor Hoo-nan).

HUPEH; (Not Hu-peh nor Hoo-pe.)

KANSU; (Not Kan-su, Kansuh, nor Kan-soo.)

KIANGSI; (Not Kiang-si nor Kiang-se.)

KIANGSU; (Not Kiang-su.)

KUANGSI; (Not Kwangsi, Kwang-si, nor Quang-se.)

KUANGTUNG; (Not Kwangtung, Kwang-tung, Kwantung, Kang-tung, nor Quang-tung.

KUEICHOU; (Not Kui-chou, Kweichou, Kwei-chow, nor Quei-chow.)

* Revision of previous decisions.

SHANGTUNG; (Not Shantung nor Shan-tung.)

SHANSI; (Not Shan-si nor Shan-se.)

SHENSI; (Not Shen-si nor Shen-se.)

SSUCH'UAN; (Not Szechuen, Sze-chuen, nor Sze-chuan.)

YÜNNAN; (Not Yunnan, Yun nan, nor Yun-nan.)

* * * * *

MUKDEN; *city, China.* (*Not Mookden nor Moukden.*)

BANKA; island, lying between Sumatra and Borneo. (Not Banca nor Bangka.)

CAPTAINS; bay, Alaska. Between Iliuliuk bay and Nateekin bay.

* Carquinez; bay, point, and strait, connecting Suisun and San Pablo bays, California. (Not Carquines, Karquines, nor Karquenas.)

* Chouteau; county, Montana. (Not Choteau.)

* Dona Ana; county, P. O., R. R. station and precinct, New Mexico. (Not Donna Ana nor Doña Ana.)

Grass; river, tributary to the St. Lawrence river, St. Lawrence County, New York. (Not De Grasse, Grasse, nor La Grasse.)

* Iliuliuk; harbour, Alaska. An arm of Unalaska bay, east of Dutch harbor. (Not Unalaska, Captains Harbor, not Levashef.)

Le Conte; bay and glacier, east of Mitkof island, Frederick sound, southeastern Alaska. (Not Hutli, Hulti, nor Thunder.)

* Lewis and Clark; county, Montana. (Not Lewis and Clarke.)

Little Salmon; stream tributary to Lake Ontario near Texas, and about 4 miles west of Salmon river, Oswego County, New York. (Not Salmon.)

Port Levashef; port, Alaska, at head of Captains bay. (Not Captains harbor nor St. Paul.)

Sycamore; creek, tributary to Verde river from the N.E., Yavapai county, Arizona. (Not Dragoon nor Dragoon Fork.)

* Revision of previous decision.

Chefoo; city, China. (Not Chifu, Chi fu, Che-foo, Chee-foo, nor Tschi-fu.)

Liaoyang; city, China. (Not Liau-yang, Liao-yang, nor Liaoyan.)

Tieling; city, China. (Not Thieling, Tie-ling, nor Telin.)

American Corners; village, P.O., and district, Caroline county, Maryland. (Not American Corner.)

Choga; creek, Macon county, North Carolina. (Not Chogee.)

Hinchinbrook; principal entrance to Prince William Sound, Southern Alaska. (Not Meiklejohn.)

Hughes; P. O. and R. R. station, Butler county, Ohio. (Not Hughs.)

Indian; creek, Chowan county, North Carolina. (Not Dillard nor Dillard Mill.)

Marshyhope; branch of the Nanticoke river, Dorchester and Caroline counties, Maryland; and Kent and Sussex counties, Delaware. (Not Marshy Hope, Marsh Hope, West Branch of Nanticoke river, West or N. W. Fork of Nanticoke, nor N. W. Prong of Nanticoke.)

Norris; glacier on the west side of Taku Inlet, southeastern Alaska. (Not Kadischle, Kadishle, nor Windom.)

Salt Lake City; city, capital of Utah. (Not Salt Lake.)

Santeetlah; creek and P. O., Graham county, North Carolina. (Not Santeetla nor Santutlah.)

Shewbird; P. O. and mountain, Clay county, North Carolina. (Not Shoo Bird nor Shoobird.)

Shoshone; established for all place-names, but not for tribal name or Reservation.

Taku; glacier at the head of Taku Inlet, southeastern Alaska. (Not Klumū Gutta, Klumma Gutta, nor Foster.)

There is substantial agreement among authorities with regard to the names of the Chinese provinces, and it does not seem to be wise to prefer the unusual forms *Anhui* and *Hsinchiang* to *Nganwhei* and *Sinkiang;* and the Board, in writing *Chefoo* for *Chifu*, disregards its own excellent principle of adopting the Italian vowel-sounds.—(Editor Bulletin.)

NEW MAPS.

AMERICA.

CANADA.—Explorations in Northern Canada and adjacent portions of Greenland and Alaska. Latitudinal scale, about 74.3 statute miles to an inch. By James White, Department of the Interior, Ottawa, 1904.

All the Arctic coasts are tinted to indicate the expeditions that explored them. The tracks of explorers are also shown.

CANADA.—Ontario (London Sheet): Scale, 1:250,000, or 3.95 statute miles to an inch. Department of the Interior, Ottawa, 1905.

A sheet of the "Standard Topographical Map." It does not attempt to show the relief of the country, but gives the Land Office Surveys, the railroads, and other cultural features.

CANADA.—Relief Map of the Dominion of Canada. Natural scale, 1:6,336,000, or 100 statute miles to an inch. By James White, Geographer, Department of the Interior, Ottawa, 1904.

A very interesting map. Tints of brown represent contours of elevation, six shades and white showing altitude from sea-level to over 10,000 feet. The Height of Land dividing the Arctic from the Atlantic and Pacific basins is given, and the drainage and railroad systems are very clearly indicated. On so small a scale the features of relief must, of course, be greatly generalized, but nothing more refined than this map is needed to show the broad, distinguishing characteristics of the surface.

UNITED STATES.—Geologic Atlas of the United States. No. 119. Fayetteville Folio. Arkansas–Missouri. 1905.

The quadrangle lies chiefly in the Springfield plain of the Ozark region, in N. W. Arkansas, between Latitudes 36° and 36° 30′ N. and Longitudes 94° and 94° 30′ W. The accompanying letterpress describes the physiography and divisions of the Ozark region. Maps—1, Topography; 2, Areal Geology.

UNITED STATES.—Map of the Western Part of North Dakota. Scale, 40 statute miles to an inch. Water Supply and Irrigation Paper, No. 17, U. S. Geol. Sur., Washington, 1905.

Shows the distribution of lignite along the Missouri and its tributaries in northwestern Dakota. The areas most favourably situated for irrigation in this region are the broad fertile terraces along the Missouri and its affluents. These terraces, however, are 15 to 100 feet in elevation above the streams. The lignite area was investigated to consider the possibility of irrigating about 250,000 acres on these terraces by pumping from the rivers directly, using lignite as fuel. On the whole, the investigation was encouraging, and opportunities to reclaim arid lands appear to exist in the larger flats of this part of Dakota.

UNITED STATES.—Land Classification Map of the Gila River Forest Reserve, New Mexico. By T. F. Rixon. Scale, 1:255,660, or 4 statute miles to an inch. U. S. Geological Survey, Washington, D. C., 1905.

Illustrates Professional Paper No. 39 on "Forest Conditions in the Gila River Forest Reserve, N. M." Tints show the woodlands, timberless areas, and the estimated quantity of timber per acre in the tracts of yellow pine.

CHILE.—Tierra del Fuego. Puertos en la Parte Occidental del Canal Beagle. Oficina Hidrográfica, Valparaiso, 1904.

Surveys on scales of .3, .5, and .6 mile to an inch of ports Edwards, Almeida, Quo-Vadis, Burnt, Fanny, Estrecho, Huemul, Fortuna, Townshend, Util, Engaño, Ballena, and Langlois. Soundings in meters.

AFRICA.

CONGO FREE STATE (Series of 4 Maps). Scale, 1:12,000,000, or 189.3 statute miles to an inch.—*Scot. Geog. Mag.*, No. 4, Edinburgh, 1905.

These maps, in all respects worthy of Bartholomew's well-known map house, were presented to the *Scottish Geographical Magazine* by Mr. J. G. Bartholomew. It was a handsome present, and will be very useful also to all students of Africa, for not even the Belgian maps show so fully the present knowledge of this vast region and of its exceptional development. Sheet 1 shows the orographical features, with six tints for elevations between sea-level and 4,000 meters; also the extent of navigation, railroads constructed and projected, and caravan routes. Sheet 2 is coloured to show the distribution of dense forests, prairies and woods, grazing, barren lands and steppes, together with Protestant and Roman Catholic mission stations. No. 3 shows the administrative districts, and distinguishes from one another the chief town, the Government stations, and the commercial stations in each district. No. 4 shows belts of cultivation, some of them very broad along the rivers, the great inner region of the rubber industry, extending from Lake Tanganyika, in the east, almost to Matadi, in the west, the colour of the area of greatest production being accentuated. The distribution of palm oil, ivory, hides, and other commercial products is printed in red letters, and an inset shows distribution of population, colours indicating thinly, well, and densely-peopled areas.

SAHARA.—Esquisse Géologique de la Région de Figuig. Par E. F. Gautier. Scale, 1:500,000, or 7.8 statute mile to an inch. *Annales de Géog.*, No. 74, Paris, 1904.

EGYPT.—The Nile. Scale, 1:12,000,000, or 189.3 statute miles to an inch. Survey Department, Cairo, 1904.

A sketch map, showing the limits of the Nile basin, with all affluents indicated to their extreme sources, as far as they are known. Illustrates "The Nile in 1904," by Sir William Willcocks.

EGYPT.—Perennial Canal System of Lower Egypt. Scale, 1:1,195,000, or 18.7 statute miles to an inch. Survey Department, Cairo, 1904.

Shows the canals and drains necessary to supply perennial irrigation through the Nile delta. Drains are required to prevent over-saturation of the soil. Illustrates the section on "Perennial Irrigation" in "The Nile in 1904," by Sir William Willcocks.

EGYPT.—Proposed Wadi Rayan Reservoir, showing the Fayoum. Scale, 1:500,000, or 7.8 statute miles to an inch. Survey Department, Cairo, 1904.

The Wadi Rayan is a depression in the desert to the south of the Fayoum, and separated from it by a limestone ridge. It is proposed to use this depression as a reservoir in completing the perennial irrigation of Lower Egypt. The central part of the depression is 40 meters below sea-level. Illustrates "The Nile in 1904," by Sir William Willcocks.

ANGLO-EGYPTIAN SUDAN.—The Albert Nile from Gondokoro to the Sobat Junction. Scale, 1:2,000,000, or 31.56 statute miles to an inch. Survey Department, Cairo, 1904.

In "The Nile in 1904," by Sir William Willcocks. The map shows the distribution of *sudd* between Gondokoro and the Bahr-el Ghazal, with the forest and swamp areas along this part of the Nile.

ANGLO-EGYPTIAN SUDAN.—Bahr el Gebel (the Nile between the Albert Nyanza and Lake No). Scale, 1:500,000, or 7.8 statute miles to an inch. Survey Department Egypt, Cairo, 1904.

A detailed map of that part of the Nile extending from 2° to 9° 30′ N. Lat. Tints show the forest areas, the grass and thorn bush regions, and the marshes along the river. The scale is large enough to emphasize the contrast between the usually broad Nile below Dufile and its very contracted width and numerous rapids among the gorges between Dufile and Rejaf. The distance along the river from Albert Nyanza is indicated for every 50 kilometers.

ABYSSINIA.—Lake Tsana. Scale, 1:300,000, or 4.73 statute miles to an inch. Survey Department Egypt, Cairo, 1904.

This map is based upon that of Dr. Anton Stecker, with additions from recent surveys by the Egyptian Government. It is the most complete map of the lake from which the Blue Nile issues yet published. The surveyors found that the map made by Dr. Stecker during his travels in 1881 was a good representation of the lake, though subject to correction in detail, especially on the south and southeast sides. The catchment area of the lake on its west and southwest sides appears to have been slightly overestimated. The normal annual oscillation of the lake's level is about 1½ meters. The map accompanies the special note on Lake Tsana by Mr. C. Dupuis in Sir William Garstin's *Report* upon the basin of the Upper Nile.

ASIA.

TOPOGRAPHICAL MAP OF THE JAPANESE EMPIRE.—Scale, 1:1,000,000, or 15.7 statute miles to an inch. With insets of Formosa and the Riu-kiu Islands, and of the Kurile Islands, scale 1:2,000,000, or 31.5 statute miles to an inch; and a hypsometrical and bathymetrical chart, scale 1:5,000,000, or 78.9 statute miles to an inch. Contour intervals 200 meters, excepting lowest two, which indicate 100 meters each. Geological Survey of Japan, 1899.

Shows most of the settlements in the empire, from city to hamlet. The nomenclature is in English and very clear, but somewhat veils the contour lines, which would not be easy to read in any case, as the scale is small. The map gives a large amount of information, most of which is clearly expressed; but the effect of representing topography by contours in a very mountainous country on so small a scale is disappointing.

TIBET.—Tibet and the surrounding regions. Compiled from the latest information. Scale, 1:3,800,000, or 59.9 statute miles to an inch. Roy. Geog. Soc., London (revised 1904).

The map was originally published in the *Geog. Jour.* in July, 1894, ten years before its revision. Routes and surveys of later explorers have been inserted.

EUROPE.

EUROPE.—Bartholomew's Railway and Steamship Map of Europe and the Mediterranean. Scale, 5:448,960, or 86 statute miles to an inch. John Bartholomew & Co., Edinburgh, 1905. (Price, 1s.)

One of the Bartholomew series of travelling maps. The main railroads and many of their connections are shown, together with ports, their sea connections, and the distances between them.

ENGLAND.—Bartholomew's New Reduced Survey (Aldershot District). Scale, 1:126,720, or 2 statute miles to an inch. John Bartholomew & Co., Edinburgh, 1905. (Price, 2s.)

Seven tints for contours of altitude. The driving and cycling roads are shown in brown, the roads being distinguished as main, secondary roads, and footpaths. One of the firm's fine reductions from the Ordnance Survey.

ATLASES.

STIELER'S HAND ATLAS.—Neue neunte Lieferungs-Ausgabe. 100 Karten in Kupferstich. Liefeiungen 43 and 44. Justus Perthes, Gotha, 1904. Price, 60 pf. for each part containing 2 map sheets.

The new sheets in this installment of the atlas, now nearly completed, are the two northern sheets of Africa, "West Sahara," by B. Domann, covering northwest Africa, between the Mediterranean and the Sudan; and "Ost Sahara," by C. Barich. The scale, enlarged from 1:10,000,000 in the Eighth to 1:7,500,000 in the present edition, is none too large for the array of new geographical facts collected in this part of Africa. The surveys that the French have pushed southward into the Sahara, the correction of erroneous place-determinations there, and the larger-scale maps, with many new place-names, relating especially to Morocco and the French Sudan, have contributed most of the fresh data.

The most notable changes in the sheet "Ost Sahara" are found in Egypt in the mountain region between the Nile and the Red Sea. Mr. Barich has finely generalized the detailed maps which the Egyptian Survey Department has made. This is the first atlas sheet on which this long-neglected corner of Africa is represented with all its more considerable features.

The plates of the general maps of South America and Asia were revised by Habenicht.

TASCHEN-ATLAS UBER ALLE TEILE DER ERDE.—In 36 Haupt- und 70 Nebenkarten, Von Chr. Peip. Mit geographisch-statistischen Notizen von Otto Weber. Deutsche Verlags-Anstalt. Stuttgart und Leipzig, 1904.

One of the excellent pocket atlases produced in Germany, and sold at a low price. It is a ready-reference atlas, showing, with a fair degree of clearness, the most important places and the chief physical features of all parts of the world. There are 36 plates, some of which—South Africa as to railroads, for example—might have been revised with advantage, as they are not quite up to date. As 23 of the 36 sheets are given to Europe, the maps of that continent are much more detailed than those of other parts of the world. The seven sheets given to Germany, on a scale of 1:3,000,000, make a fairly complete map fitted to the pocket, for the scale is half as large as those of the maps of the leading European States in the best German atlases. There are many insets, chiefly town plans, and 80 pp. of geographical statistics.

BOOK NOTICES.

Grundriss der Wildbachverbauung. Von Ferdinand Wang, k. k. Forstrat, etc. Zweiter Theil. Mit 85 Abbildungen und 79 Figuren im Texte. Leipzig, Verlag von S. Mirzel, 1903.

This second volume of the author's large work on the regulation of mountain torrents and the reforestation of dangerous slopes contains the practical application of the theories of the phenomena discussed in the first volume. It appeals especially to the engineer interested in similar subjects by the extensive and instructive records, illustrated by many fine pictures and diagrams, of the methods used and the results accomplished in this work in the European countries. The main objects of the work are protection from the dangerous sudden floods in mountainous regions, reduction of the transporting and erosive power of mountain torrents, regulation of the water supply in the adjoining districts, prevention of landslides, protection from avalanches, etc. The book tells how these objects have been secured by regulating the grades of ravines and gullies, or terracing them, by means of dams or brush fences, by lining the bottoms or the sides of the streams with stones or boards, by covering unsafe slopes with sod, or sowing them with certain mixtures of grasses whose roots have been proved by experiment to hold the soil better than others, and finally, of course, planting them with shrubs or trees. Each of the various methods is fully discussed as to the details of the work itself, the special qualities of each, the applicability of the individual scheme to different conditions; and estimates of the average cost are given. As an especially interesting fact it must be noted that in Austria very good results have been obtained for a number of years by employing convicts from the State prisons to do the work, and thereby making them of some use for the State in return for their board and lodging. This does not mean that the State obtains their work much cheaper than it would that of regular workmen, for, although their wages are naturally very low, they are given credit for the money, and do not receive it before the end of their term, when the whole sum is handed over to them for their new start in life. Their support in those mountain camps, often many miles away from human habitations, is considerably more expensive than it would be in the prison. But the arrangement secures a steady supply of willing hands, since being sent to the camp is a privilege granted for good behaviour, and the exchange of the prison atmosphere for outdoor life and exercise is so much appreciated by the men that the only punishment for insubordination or laziness—return to the prison—has hardly ever been used, and no attempts to escape from the camps have been recorded. Their work seems to redeem even the doubtful past of those men in the estimation of their neighbours, for in several cases free workmen have been found willing to work together with the convicts, and an instance is even quoted of a fire in one of the villages at which the whole camp set out to assist the firemen and of their own accord returned, each and every one of them, to their place of work. It need not be said at what advantage, physically and morally, such a man will find himself at his re-entrance in the world in comparison with his fellow-prisoners who served their terms behind the bars. It seems that both the economic and philanthropic sides of this experience deserve the attention of all who wish to start similar work in this country.

The last part of the book is given over to legislation on, and progress of, the

work in the different countries. Reports are available from France, Austria, Switzerland, Italy, Germany, Russia, Greece, Spain, and Japan. France is by far the leading country. Bills forbidding deforestation of slopes were issued there as early as 1718 and 1753. The present laws date from the middle of the 19th century, the last of April 4, 1882, requiring a survey and division into so-called "périmètres" of all the Alpine, Cevennes, Plateau Central, and Pyrenees districts. Endangered perimeters are bought up by the State and then improved. The towns and the landowners contribute toward the cost of the improvement, if they are directly benefited by it. Up to 1892 the work achieved included the reforestation of 82,429 hectares of land, the building of 384 first-class, 1,906 second-class, and 17,539 "rustic" dams, the regulation of 340 kilometers of brooks and the draining of 218, the building of 3,875 kilometers of roads, and of 978 kilometers of fences, at a total cost of 27½ million of francs. Switzerland and Austria are next, both in legislation and in the extension of the work; in Germany there used to be need for it only in Alpine districts, but similar work has recently been started in the basin of the Oder, whose floods have been the most destructive in the empire during the last decade. In the other countries, including even Italy, with its large share of Alpine territory, the work is still in the initial stage, while Japan has developed some methods of her own, and adopted others of European origin, whose combination has resulted in some quite remarkable work. M. K. G.

Handbuch der Erdbebenkunde. Von August Sieberg, Erster Assistent am Meteorologischen Observatorium in Aachen. Mit 113 Abbildungen und Karten im Text. Braunschweig, Druck und Verlag von Friedrich Vieweg und Sohn. 1904.

This book is intended, according to an introductory note of the author (*a*) to give a summary of the most important facts, principles, and problems of seismology for the information of the non-specialist, and (*b*) to furnish the specialist with a working knowledge of modern methods and apparatus for seismological work. This two-fold purpose practically divides the book into two quite different parts, each of which must be judged from its own point of view. As a separate unit each part ranks with the best that has been published in this line. The introduction and Chapters I and II form the general part. They contain a presentation of seismic phenomena which any one desirous of a well-balanced general information on the subject will easily understand and enjoy. Eminently readable, and free from technical detail, it reminds one of Geikie's class-books, in that it proves that often the best introduction into the elementary aspects of a science can be given by the scientist who knows best how to discern between the essential and the more secondary aspects of the subject. In a brief but complete and satisfactory way, scholarly in spirit and simple in presentation, the main phenomena of seismic activity are discussed, the geographical distribution of earthquakes, both on land and beneath the sea (the latter called "seebeben" sea-quakes, in opposition to earthquakes proper), their causes, foci, epicentra, transit, duration, intensity, frequency, effects, and minor phenomena accompanying the shocks.

The second part, embracing Chapters III and IV, contains descriptions of the various seismic instruments, directions for their use, and hints for their value under various conditions, formulas for seismic calculations, practical suggestions on the collection of seismological data and how to work up the statistical material gathered from various sources, and the like. It is exclusively a guide for working seismologists, and the question may not be out of place whether it would not be wiser, after

all, in a new edition, to publish these chapters separately as a manual for seismic observations and replace them in the book by a reduction of their contents to the scope of the preceding chapters. Such a change might greatly increase the saleability of the book, since the general part is of only limited value to the professional seismologist, who, when in need of a reference, is likely to consult a larger handbook, while the general reader may not be willing to pay for the whole of such an expensive book when only one half is within the limits of his understanding.

The last chapter (V.), untechnical again, contains a general survey of the history, present tendencies, modern methods, and practical application of seismology, including reports on the work accomplished in the various states of the civilized world, a list of the existing seismological stations and their apparatus, and reports on the proceedings of the first two International Seismological Conferences, in 1901 and 1903. Two indices, one of names and one of subjects, greatly add to the usefulness of the book for the reader; and so do reference tables, for the calculation of distant tremors for the scientist. The book is well illustrated with pictures and diagrams, which, among a number of well-known typical illustrations, include also much that is not found in the average text-book. M. K. G.

Actual India. By Arthur Sawtell. viii and 120 pp., map and index. Elliot Stock, London, 1904.

It has been impossible hitherto to get a clear idea of the somewhat complicated system of British government in India without the uninspiring labour of consulting a number of large books, including official publications. Perhaps the difficulty of obtaining this knowledge may explain the phenomenon to which Lord Curzon recently referred when he said he sometimes thought that the most remarkable thing about British rule in India was the general ignorance about it in England. This little book gives just the information that is needed to make clear the methods of British rule and the fundamental policies that shape the measures of the Indian Government and direct its work.

After an excellent chapter on the geography of India, the book sketches the leading features of the Indian administration of to-day, shows its relations with Britain, the nominal control of Parliament, what the Government consists of both on its executive and its legislative side, describes the Provincial Council, local self-government, the India Civil Service, the district as the unit of administration, and other features, from the Viceroy, Governors, and Judiciary to the Collectors of Districts. Such topics as the defences of India, its foreign policy, the cost of government, "The Prosperity Problem," industrial development, and English influence have each a chapter to themselves. The book is not merely a compendium of facts, for the author is avowedly an admirer of the British system in India, and his pages evince some of his enthusiasm; but he avoids partizanship, and his work will fill a void that is felt by all who wish to have an intelligent idea of Indian affairs.

Kleines Orts-Lexikon von Osterreich-Ungarn. Von Dr. K. Peucker. x und 142 Ss. Artaria & Co., Vienna, 1904. (Price, K. 2.50.)

The third edition of a little book that is convenient to handle and is packed with information about the towns of Austria-Hungary. It gives the name of every place of 2,000 or more inhabitants, and of all other places of importance for tourists, commerce, or communications, with much condensed information, including the height above the sea. Towns of more than 15,000 inhabitants have detailed tables showing the movement of population in each district, the percentage of growth or loss, and many other facts.

Les Çomâlis. Par Gabriel Ferrand. xiv et 284 pp. (No index.) Ernest Leroux, Paris, 1903.

This is the first of a series of volumes which will present "Materials for the Study of Mohammedan Countries." This series is under the editorship of Prof. A, Le Chatelier of the College of France, who is to be congratulated upon opening this collection of studies with a book that so well presents and classifies the existing information about Somaliland. Mr. Ferrand says that the barbarism and fanaticism of the Somalis are responsible for our ignorance of their country in nearly all its aspects. He describes what is known of the physical geography of Somaliland, sketches the history of the people, according to the leading authorities, outlines the explorations of the XIXth Century, and treats of the languages, which are a part of the Ethiopic group of the Hamitic. He then describes the tribes in detail, with separate chapters on their social organization, their music and songs, Christianity and Islam, and the political partition of the country. Perhaps the best summary of information that has appeared on the Mahdi, Mohammed Ben Abdallah (the Mad Mullah)—who he is, what he represents, and the campaigns against him—is found in the 38 pages of the last chapter.

Zwei Jahre unter den Kannibalen der Salomo-Inseln. Von Carl Ribbe. vii und 352 Ss., 3 Karten, 14 Tafeln, Abbildungen und 10 Beilagen. (Index) Herman Beyer, Dresden-Blasewitz, 1903.

Mr. Ribbe is a naturalist who improved the opportunity to spend two years (1894–96) among the islands of the Solomon Archipelago. He made large collections in natural history and studied the natives as far as he was able to do at the white stations along the coasts. He lived most of the time at the Shortland Islands, just south of Bougainville, and his trips along the coasts did not extend farther south than the Central islands of the New Georgia group; thus his attention was confined to the northern third of the archipelago.

He brings no further information about the interior than any of his predecessors, but his large book is one of the most valuable contributions yet made to the knowledge of this archipelago. It is imbued with scientific spirit, abounds with information, and is especially rich in descriptions of the natives. The appendix is devoted to anthropological measurements, and a large number of tracings of facial profiles, hands, and feet are given. Vocabularies collected in various islands are arranged for purposes of comparison.

None of his predecessors gives the islanders a worse reputation than the present writer. He says that no more treacherous peoples exist, and that the white man is not safe for a minute without a revolver at hand. And yet some of the natives buy their potatoes and rice from the whites, and are very glad to sell him their large crops of cocoanuts. They come down to the coast to transact business with the trader in the daytime, and incidentally try to ascertain the position of his bed, hoping to be able to shoot him at night through the wall. The barter trade is very profitable, which is all that keeps the whites along the coasts. Some of them bring their wives and children to the islands, and the women, Mr. Ribbe says, are as brave and wary as the men folk.

No white man ventures inland; the trader keeps to the sea edge, where he dries his coprá and lives among his barter goods. The result is that almost nothing is known accurately of the interior of the islands, and the larger islands are absolutely untraversed. We know something of the topography, because sketches and surveys have been made from the decks of vessels. Such dominating features, however, as

the Kronprinz Range, which forms the backbone of Bougainville, have never been reached by an explorer, and the largest-scale maps are likely to give only such information as this printed across the blank spaces of the islands: "Flat from this point to the coast and well wooded;" "many villages lie from 5 to 10 kilometers inland;" "coast region wooded," etc.

The illustrations, chiefly from the author's photographs and drawings, show the natives in their physical characteristics; groups of them are seen in their vocations or dances, and their industrial processes, such as weaving and pottery-making, and their musical instruments, fishing appliances, and other arts are illustrated. The index facilitates reference to every page, and the work is a storehouse of information which is not likely to be supplanted for many years.

Paris and Environs. By Karl Baedeker. liv and 458 pp., 13 maps, 38 plans, besides Index of Streets and Plans of Paris, 42 pp. Index. Karl Baedeker, Leipzig, 1904. (Price, M. 8.)

The fifteenth edition of this handbook. Like its predecessors, it will go far to make the traveller independent of guides and help him to plan for the economic expenditure of time and money. The accounts of the routes from London to Paris include maps of Boulogne, Amiens, Calais, Dieppe, Rouen, and Le Havre. The American tourists, who now land directly at Cherbourg, without visiting England, will be likely to consider a map of Cherbourg a valuable addition to the volume.

Into the Yukon. By William Seymour Edwards. xii and 312 pp., 98 Illustrations and two maps. No Index. The Robert Clarke Co., Cincinnati, 1904.

This is a sketchy, brightly-written book of travels, with no waste of words and crowded with crisp bits of description, and just the kind of information to enlighten the reader on the things he most desires to know concerning a place or region. It covers the author's routes from Cleveland to Dawson, on the Yukon, and through our Pacific States, between Puget Sound and Los Angeles, and back to St. Louis. The small half-tone pictures are a feature of distinctive excellence. One picture gives a glimpse of the first agricultural fair held at Dawson, of which the author says:

> The display of vegetables and flowers especially astonished me. The biggest beets I have ever seen, the meaty substance all clear, solid, firm, and juicy. Potatoes, Early Rose, and other varieties, some new kinds raised from seed in three years—large, a pound or more in size. And such cabbage, cauliflower, and lettuce as you never saw before. Many kinds full-headed, and able to compete with any produced anywhere. All these raised in the open air, on the rich, black bottom and bench lands of the Yukon.

There was also a display of fine ripe strawberries, and the "show of oats, rye, barley, wheat, and timothy and native grasses, as well as of red and white clover, proved that this Yukon region is capable of raising varied and nutritious crops necessary for man's food, and for the support of horses and cattle." The author says that not a few men, instead of hunting for gold, have gone into raising vegetables, hay and grain, and get fabulous prices for their products.

Agricultural and Pastoral Prospects of South Africa. By Owen Thomas. vii and 335 pp., Map and Index. Archibald Constable & Co., Ltd., London, 1904. (Price, 6s.)

The author treats of South Africa from Cape Colony to Northern Rhodesia, north of the Zambezi, in its agricultural and grazing aspects. He deals first with the

country in its physical and geological features, its soils, and climatic conditions. Then he discusses the questions of land tenure and land values, the various systems of farming, the respective advantages and disadvantages of agriculture and stock-farming, and devotes a few chapters to the diseases of animals, insects, agricultural credit, colonization, native labour, and the Boer. The last third of the book is devoted to the study in detail of farming and grazing in each of the political divisions of South Africa. The book is filled with the greatest variety of information for all who are especially interested in the important practical questions it treats. The map, on a a scale of 80 statute miles to an inch, is excellent for its purposes.

The Truth about Morocco. By M. Aflalo. xxii and 283 pp. No Index. John Lane, New York and London, 1904. (Price, $1.50.)

Mr. Aflalo, for ten years, held an official position in Morocco under the late Sultan, and during the Regency, before the present Sultan ascended the throne. His unsurpassed opportunities for learning the facts about Morocco entitle his opinions on the social and political status of the country to much respect. The purpose of his book is to set forth the reasons for his opinion that the recent Anglo-French agreement, by which Morocco is practically placed under the full control of France, was a great blunder, and that it will be against the interests of the world at large, as well as of Morocco, to carry it out. Whether or not his readers agree with him they will be glad of the opportunity to read a book in which so many valuable facts relating to the political and commercial position of Morocco are so well summarized as in this volume.

The Origin and Growth of the English Colonies and of their System of Government. By Hugh Edward Edgerton. viii and 224 pp., 8 maps, Appendix, and Index. The Clarendon Press, Oxford, 1903.

This is a new edition of the "Introduction to a Historical Geography of the British Colonies," written by C. P. Lucas in 1887. The book, however, has not merely been edited and revised, but its scope has been enlarged. Speaking generally, the author affirms that a number of the European States became colonial powers, not with any conscious aim of acquiring possessions, but, as it were, by accident. They were seeking to open new trade routes, and thereby to develop commerce, and "found in the East that trade with uncivilized natives was too precarious to be profitable, unless it could depend upon bases possessed by the European Power, which should protect the trader; while in the West the new world, opened out by Columbus, proved a sufficient end in itself." The volume not only presents a study of the rise and progress of the British Colonial Empire, but precedes it with a lucid and detailed account of the manner in which the system of colonial government in general was developed in the course of three centuries.

The Penetration of Arabia. A Record of the Development of Western Knowledge concerning the Arabian Peninsula. By David George Hogarth. xiii and 359 pp., 30 Pictures, 22 Maps and Plans, and Index. Frederick A. Stokes Company, New York, 1904.

This volume is one of the excellent series giving "The Story of Exploration." It is not only a history of the exploration of Arabia, with critical judgment as to the value of each explorer's contribution, but also a summary of the whole work up to this time. Arabia is not yet entirely visible to Western eyes, but the main features of the interior, as well as the coast-lines, are now understood ; and, in the author's

opinion, when the present political changes and convulsions have ceased, Europeans will complete the penetration of this region.

After a summary of the slow and meagre progress of Western knowledge of Arabia before recent times, Mr. Hogarth discusses the work of modern explorers, from Niebuhr, in the middle of the 18th century, to Hurgronje, in 1885. The list is not a long one, but it includes at least 12 or 15 men of varied and great gifts like Niebuhr, Burckhardt, Burton, Palgrave, Halévy, Blunt, and others who hazarded themselves in a land that, away from parts of the coast, is almost naked and forbidding in every aspect. The author's estimate of a few of these men may briefly be given here, beginning with Niebuhr, who studied the fertile coast regions of the Yemen:

> The primacy always conceded to Niebuhr among Arabian travellers is not due to his priority in time, but to the priority of his merit. He and his party undertook a double task, to explore the most fertile part of Arabia known to Europe, and to collect there the best possible information about all the rest of the peninsula. Both tasks were carried out in a way which, when all circumstances are considered, is beyond criticism.

Of Burckhardt, who wrote the first modern description of Mecca, the author says:

> The credit due to Burckhardt is not for seeing many things in much of Arabia, but for seeing much in a little of it, thanks to his clear vision and the careful preparation of his mind by the study of native authorities. His glory is to have described not so much that was new to Western science as so much that was true then and is true still. He was the first of Arabian travellers to realize fully the explorer's obligation to serve all sorts and kinds of inquiry, and few travellers have left so little for the man who may come after them.

We have Richard Burton to thank for our knowledge of the wild granitic region of the ancient Midian, in the northern part of Arabia. He also traced the most eastern of the four possible routes to Mecca from the north:

> In his description of the capital of Islam, Burton has done little more than (in his own words) "pay homage to the memory of the accurate Burckhardt"; and as for the great Mosque, he was content to reproduce the plan of Ali Bey. * * * The vivid style and descriptive power of his narrative attracted an audience to which Burckhardt's sober journal had remained unknown and so greatly dominated popular fancy that at this day those who know that any European has tried to reach Mecca for the most part believe that Burton alone succeeded.

Hurgronje, landing at Jidda in 1885, spent five months in Mecca during the long interval between the departure and arrival of the pilgrim caravans, and was the only European, except, perhaps, Burckhardt, who saw the city under its normal conditions:

> This fact, added to his command of Arabic and profound acquaintance with native authorities upon the history of the Hijaz, makes his book on Mecca of especial interest. He gives an elaborate description of the town, bearing witness to Burckhardt's accuracy. Little seems to have changed, except the level of the residential part of the town, which is slowly rising round the great mosque and the holy houses. . . . The result is to leave the Ka'bah in a deep hollow, two or three metres below the streets, which receives all flood waters. By far the most valuable part of Hurgronje's book, however, besides the historical half of it, is that devoted to Meccan society; its street markets for slaves; its holy places and their guardians; its servile and freedman elements; its houses, festivals, and guilds; its vices of turbulence, bigotry, and lust, and its virtues of easy hospitality and humanity. Hurgronje's is as minute a study of Arab urban life as could be made from the purely European point of view.

The book is scholarly, like all the writings of its author. It is the result of a critical study of the literature of the subject from which Mr. Hogarth has evolved the history of the gradual unfolding before our eyes of the vast interior with its deserts, oases, lava fields, and routes; and after telling when, how, and by whom these various features were discovered, he presents Arabia, no longer piecemeal, but as a whole. The publishers have produced the book handsomely, and the two maps by

Bartholomew, already reviewed in the BULLETIN (Feb., 1905, p. 113), take their place with the sheet in the Ninth edition of Stieler's Hand Atlas as the best maps yet made of Arabia.

Abessinien und die Evangelische Kirche. Von Carl Paul. (Second Edition.) x and 148 pp. C. Ludwig Ungelenk, Dresden-A and Leipzig, 1905. (Price, M. 1.50).

This is No. 5 of the series entitled "Missionsstunden." The writer gives a chapter to the Abyssinians and their country, describes the Abyssinian Church (Coptic), "a Christian rock island in the midst of Islam, but spiritually palsied," tells the history of the evangelical missions and their progress, sketches the black Jews and their Jewish missions, and reports on the latest missionary undertakings.

London and its Environs. Handbook for Travellers. By Karl Baedeker. x and 471 pp., with index of streets and plans of London, 44 pp., 4 maps, and 24 plans. Fourteenth Revised Edition. Karl Baedeker, Leipzig, 1905.

This edition contains the most recent information down to October, 1904. Especial attention has been given to the description of the great public collections, such as those in the National Gallery, the British Museum, the Wallace Collections, the National Portrait Gallery, the Tate Gallery, and the South Kensington Museum.

Russia, the Land of the White Czar. By E. C. Phillips (Mrs. Horace B. Looker). viii and 186 pp., and 51 illustrations. Cassell & Co., Limited, New York and London, 1904.

A book written for young folks with the purpose of giving them entertaining information about the Russian Empire. Two boys and their families figure prominently, the idea being, apparently, that they will lend variety and animation to these comprehensive sketches, which take in the wonders of St. Petersburg and Moscow, the Samoyeds and their reindeer, prison life in Siberia, the Nizhni-Novgorod Fair, and many other aspects of the Empire. Some of the pictures are typical of high and humble life in Russia.

The Climate of Australasia in reference to its Control by the Southern Ocean. By Prof. J. W. Gregory, D.Sc., F.R.S. 96 pp., 18 Maps and Diagrams and 3 Appendices. Whitcombe & Tombs, Melbourne. (No date.) (Price, 1s.)

The Presidential Address delivered by Dr. Gregory before the geographical section of the Australasian Association for the Advancement of Science on January 11, 1904. In this suggestive monograph Dr. Gregory treats chiefly of the "influence of the oceanic circulation as its effects may be traced directly in the land masses of the southern hemisphere." He does not agree with the meteorologists who regard seasonal weather predictions as an unattainable vision. He cites the Indian Meteorological Department, which "has issued seasonal forecasts for the last fifteen years—and with brilliant success":

> Fortunately for Australasia, our meteorological conditions are far simpler than those of Europe, so that we may expect much greater certainty in weather prediction. I see no impossibility in future Australian meteorologists foretelling correctly a year ahead the general nature of the approaching seasons. But such insight will never come to us until we have done our part, and studied the hydrography of the Southern Ocean, with the same methods which have yielded such profitable results in the North Atlantic, and to India.

The Geography of Victoria: Historical, Physical, and Political. By J. W. Gregory, D.Sc., F.R.S. 290 pp., 116 Illustrations, Maps and Diagrams, 4 Appendices, Glossary, and Index. Whitcombe & Tombs, Limited, Melbourne, 1903. (Price, 3s. 6d.)

Dr. Gregory spent only about four years in Victoria, Australia, as Professor of Geology in the University of Melbourne, but he rendered important services to education in that State. One of them was the writing of this volume, the first to treat the geography of Victoria in relation to the development of its topography. He defines the different geographic divisions of the State, explains their relations, and treats the region with special fulness on the physiographic and economic sides. A careful reader of this book will not only see Victoria clearly revealed, but will also have before him the means of careful training in most branches of physical geographhy.

Mexico Yesterday and To-day (1876–1904). By Bernardo Mallen. 84 pp., City of Mexico, 1904.

The material progress of Mexico in the past thirty years has been remarkable. This book was prepared in various languages with authority of the Mexican Government, and distributed at the World's Fair in St. Louis. The book illustrates in a general and complete manner the great progress that Mexico has made in all branches of activity during its period of evolution. It is a comparison, with many statistical data, of the condition of Mexico in these two periods of history. Nothing could better emphasize the enormous difference between the revolutionary Mexico of 1876 and the Mexico occupied with peaceful pursuits of 1904, than the impressive and authentic facts and figures given in this volume.

Ausgewählte Stücke aus den Klassikern der Geographie für den Gebrauch an Hochschulen. Zusammengestellt von O. Krümmel (Dritte Reihe). vii and 208 pp., 21 Illustrations in the text. Lipsius & Tischer, Kiel and Leipzig, 1904. (Price, M. 2.50.)

Attention was called in the BULLETIN (1904, p. 189), to the first and second volumes of these extracts from the classics of geography. The present volume is the third and last of the series. It is gratifying to learn that the series has been favourably received in German high schools. There should certainly be a place for books filled with the best things in geographical literature and at the same time handsomely printed. The present volume contains "Vicissitudes in Climate caused by Geographical Changes," from "Principles of Geology," by Sir Charles Lyell; "Die Entstehung der Alpen," by Prof. Eduard Suess; "Die Lösslandschaften in nördlichen China und ihre Beziehung zu Zentralasien," from "China," by Ferdinand von Richthofen; "Über Abrasion und Transgression," from the same work; "Die allgemeine Geobotanik," by August Grisebach; and "Konstantinopel," by J. G. Kohl.

Commercial Geography of the World. By A. J. Herbertson. 420 pp., Maps, Indexes and Appendices. W. & R. Chambers, Limited, London and Edinburgh, 1905. (Price, 3s. 6d.)

The first part, treating of the British Isles, is a revised edition of "Commercial Geography of the British Isles," which was published in 1899. The second part takes in the rest of the world, and each part has its own pagination, index, and statistical appendix. They are thus two books in one volume, presenting for the

student a simple treatment of the whole subject of commercial geography. About three-fourths of the book are given to the British Empire; and the concluding chapter presents the most salient features of our own commercial geography, very concisely expressed, to be sure, as only 12 pp. are given to the United States.

A. Hartleben's Kleines Statistisches Taschenbuch über alle Länder der Erde. (Zwölfter Jahrgang.) Nach den neuesten Angaben bearbeitet von Professor Dr. Friedrich Umlauft. Wien und Leipzig, 1905.

The twelfth year of publication of this small but authoritative compilation of the statistics of all countries. The four pages on the United States, for example, give the form of government, the number of States and Territories, the name of the President, the area, population, nationalities, religions, national finances, number of vessels in the merchant marine, trade statistics, length of railroads and telegraph lines, number of post offices, the weights, measures, and money, statistics of army and navy, a list of cities and their population, and the area and population of the States, Territories, and Colonies.

Hartleben's Statistische Tabelle über alle Staaten der Erde for 1905 gives the same information on a large sheet.

Report upon the Basin of the Upper Nile; with Proposals for the Improvement of that River. By Sir William Garstin, Under Secretary of State for Public Works in Egypt. To which is attached a report upon Lake Tsana, and the rivers of the Eastern Soudan, by Mr. G. Dupuis. With Maps and Appendices. National Printing Department, Cairo, 1904.

The Nile in 1904. By Sir William Willcocks. National Printing Department, Cairo, 1904. Spon & Chamberlain, 123 Liberty St., New York. (Price, 9s.)

Geographers will be especially pleased to add these two volumes to their sources of information. No writer on any of the natural phases of the Nile basin, or on the efforts to develop its resources, can afford to neglect them. They give the results of all the latest explorations and studies in a field where there was, and still is, much to learn; a considerable amount of the data usually employed in describing the Nile basin, and the régime of its waters, will have to be revised in the light of the information now supplied.

Sir William Garstin's *Report* is one of the finest specimens of book-making yet produced by the Egyptian Ministry of Public Works. It is a handsome folio of 290 pages printed in large type, and with numerous maps, plans, and photographic reproductions. Sir William describes his recent visit to the Equatorial Lakes, summarizes the result of five years' consecutive observations on the Bahr-el-Gebel (the Nile from Albert Nyanza to the Bahr-el-Ghazal), and incidentally coördinates with his own narrative geographical information supplied by earlier observers. The result is a readable book, in spite of its technical character.

There are as yet no means of ascertaining the altitudes along the river from Victoria Lake to Khartum, as barometric and hypsometric determinations afford the only data for the relief of the country, and the results are therefore only approximate. Within two or three years, however, spirit-levelling will probably be carried up the White Nile and the Bahr-el-Gebel.

There has been considerable discussion as to whether the region of the Victoria

Nyanza was in process of desiccation, it having been asserted that a steady fall in the levels has occurred during the last 20 or 30 years. There is no doubt that a lowering of the surface has been in progress for the past 7 years; but Sir William Garstin says that during this period the rainfall was much below the average, and, in 1899, failed almost completely in the northern part of the lake. If there were a permanent fall in the Victoria Nyanza it could only be accounted for either by a general reduction in the annual rainfall or by the lowering of the bar at the Ripon Falls, the outlet of the lake. A careful examination of the Falls shows no sign of any degradation of the rock ridge, which will, of course, be lowered in time; but the process will be extremely slow. It is probable, therefore, that the fall in level is not a permanent one, but that when heavy rains set in again the lake will rise to its former level. This view is confirmed by later information, recorded in a footnote, reporting heavy rains, the rising of the waters and the disappearance under the flood of the land gained in the past few years. The maximum oscillation of the lake is from 1 to 3 feet.

It is impossible in this brief review to give any summary of the author's detailed description of the Equatorial head streams and lake sources of the Nile, or of the wide areas in which they are placed. He makes one statement, however, that will startle many writers who have repeatedly affirmed that the Equatorial Lakes supply the larger part of the water that reaches Egypt:

> It may be stated, with confidence, that the White Nile contributes practically nothing to the flood which reaches Egypt. This is entirely derived from the Blue Nile and from the Atbara. On the other hand, the supply passing Aswan [Assuan], during the spring and early summer, is due, almost entirely, to the waters of the great lakes, brought down by the White Nile (p. 171).

With regard to the future utilization of the Nile, Sir William Garstin says that the two main objects are to increase the water supply of Egypt in the summer and to secure similar advantages for the Sudan in the same period. Both these ends are of equal importance, though an ample water supply for Egypt is likely to bring in an earlier return for the expenditure. He thinks the best way to secure these results would be

> to reserve the waters of the Blue Nile for the improvement of the countries bordering that river, while Egypt, and the area of the Nile Valley lying to the north of Khartum, shall derive their summer supply from the sister river (p. 172).

He describes the schemes for the regulation of the two great lakes that feed the White Nile and for the prevention of the waste of water, through evaporation, caused by the vast swamps through which the river passes in the upper part of it course. He gives the grounds upon which he concludes that the regulation of the Victoria and Albert Lakes will present no insuperable difficulties; as to the improvement of the channel of the Bahr-el-Gebel so as to prevent the great wastage of water in the marshes, his proposal is to construct an entirely new channel for the Bahr-el-Gebel, which would not be much larger than one of the great canals of Egypt, and would probably have a north and south alignment from Bor to the Sobat confluence, a distance of 340 kilometers. The object would be to preserve the regulating power of the marshes for the flood water and, at the same time, to prevent the present wastage in the river during the dry season.

Sir William Willcocks' book, "The Nile in 1904," is a volume of 225 pages, 21 plates and maps, and a large number of tables, the whole comprising a summary of our present knowledge of the waters in the Nile Basin, the present state of irrigation, and the improvements needed to render it perennial. The book embraces, either in summary or detail, the large additions to information that the studies of the past few years have yielded. It supplements the great book of Lombardini, published

over forty years ago, and brings knowledge down to the present time. Sir William Willcocks says the mystery of the Nile is still far from being solved, but that enormous steps in advance have been made by the publication of Sir William Garstin's Report above noticed; and, it may be added, by this volume, which has closely followed it from the press.

The book first describes the courses, slopes, velocities, catchment basins, and discharges of the Nile and its tributaries, and treats of the climate and geology of the Nile Valley. In the second chapter the tributaries of the river and the various reaches of the Nile itself are discussed. Chapter III is devoted to the utilization of the Nile, the river in flood and in low supply, the soils of its valley, and the different methods of irrigation and flood protection. Chapter IV deals with projects for water storage and flood control, the change from basin to perennial irrigation, and the development of the Sudan. Chapter V, written by Mr. H. J. L. Beadnell, is descriptive of the geology of Egypt, its economic projects, and the Egyptian oases in the Libyan Desert.

The appendices contain a large number of tables on the discharges of the Nile and its tributaries at various points, the low and high water levels, the canal discharges and temperature, and barometrical, precipitation, and other tables for different parts of the Nile Basin.

Both writers agree that the Blue Nile and the Atbara contribute to Egypt not only most of the fertility but also most of the water. Sir William Willcocks says:

> If we take 3,000 cubic metres per second as the average annual flow past Assuan we may say that the White Nile supplies 24 per cent. from more than half the area of the whole basin; the Blue Nile, 65 per cent. from one-tenth the area, and the Atbara 11 per cent. from one-twelfth of the area. The Gazelle River drains about one-sixth of the total area and adds practically nothing to the discharge.

The mean discharges for 1902 of the White Nile, Blue Nile and Atbara together were 3,560 cubic meters per second. Sir William discusses at length the great irrigation problems upon the solution of which depends the full utilization of the soil of Egypt.

> Egypt has a total irrigable area of 6¼ millions acres. Of this area, 250,000 acres, which are to-day inundated in flood and lie along the edge of the deserts, must continue to be inundated in flood for all time to prevent the sands of the desert from spreading over the Nile Valley. Their value is £5,000,000. Four million acres are perennially irrigated. They have a mean value of £55 per acre, and a total value of £220,000,000. Of the remaining 2,000,000 acres, two-thirds are irrigated only in flood, and one-third is not irrigated at all. These 2,000,000 acres have a mean value of £25 per acre and are worth £50,000,000. The land of Egypt may be considered as worth £275,000,000 to-day. If it were possible perennially to irrigate the 2,000,000 acres which are without such irrigation their value would be increased by £30 per acre, or by £60,000,000.
>
> The problem is how to provide perennial irrigation for these 2,000,000 acres, and so add £60,000,000 to the wealth of the country. To do this Egypt requires reservoirs capable of storing 4 milliards of cubic metres of water.

Sir William Willcocks' project for providing all the water required for perennial irrigation has been outlined in the BULLETIN (1904, No. 4, p. 233). In brief, it is to add 6 meters to the height of the Assuan dam, which will then hold up another milliard of cubic meters of water; this improvement to be supplemented by building the projected Wady Rayan reservoir, which, in conjunction with the Assuan reservoir, will supply all the water required for perennial irrigation.

Sir William commends the construction of the railroad between the Red Sea and the Nile now in progress, and advises the building of the proposed railroad along the Nile between Dongola and Abu Hamed. These two railroads are essential to the development of the Sudan. When they are in working order, irrigation projects may be carried out for the production of Sudanese cotton and wheat for export. Not

until the railroads are built can such commodities be exported at a cost of transport that is not prohibitive.

Report on the Climate and Weather of Baltimore and Vicinity. By Oliver L. Fassig. Maryland Weather Service. Special Publication, Vol. II., Part 1b. 4to. Baltimore, 1905. Pp. 148–309.

Part 1a of the new *Report on the Climate and Weather of Baltimore and Vicinity* was reviewed in this BULLETIN for November, 1904, pp. 707–709, and what was said regarding Part 1a of this volume is true also of Part 1b, which has now been issued. This portion completes the Report on the *Climate* of Baltimore, Part II, which is promised for June 1st, or thereabouts, will comprise the Report on the *Weather* of Baltimore, and will also contain the introduction, table of contents, and index of the whole volume.

The present part (1b) deals with humidity, precipitation, sunshine and cloudiness, winds, and electrical phenomena. It also contains, at the end, an historical account of the observations and the instrumental equipment at the Baltimore station of the Weather Bureau. The same completeness of discussion, the same abundance of illustration, numerical and graphic, and the same appreciative attention to details are noted in Part 1b as were pointed out in connection with Part 1a. It is a great satisfaction to find so laborious a piece of work as this, and one which was much needed as a pattern for other studies of like character so thoroughly done. The diagrams that particularly attracted the reviewer's attention were the selected relative humidity charts (Pl. VIII), with their emphasis on the *weather* element; the average hourly wind direction (Pl. XI), the westerly winds being in blue and the easterly in red, and the diagram showing a remarkable abrupt change in direction from westerly to easterly at about noon during all months except those of winter, the prevailing monthly directions of the wind in warm, normal and cold seasons and years (Fig. 76), and a series of plates (XIII to XVII) in which eight selected factors, expressed as departures from the normal climatic conditions at Baltimore, are presented for each season and year from 1871 to 1904.

The second volume of this Report is awaited with interest.

R. DeC. W.

International Catalogue of Scientific Literature. Second Annual Issue. F. Meteorology, including Terrestrial Magnetism. 8vo. London, September, 1904. Pp. 296.

The second annual issue of the volume on meteorology of the International Catalogue of Scientific Literature contains the titles for 1902, as well as some for 1901, which were omitted from the first issue. It is a satisfaction to note that the singular omission of all titles in the *Meteorologische Zeitschrift*—the most important meteorological journal in the world—which characterized the first volume of Meteorology, has been made good, the present issue containing the omitted 1901 titles, as well as those for 1902. The same thing is true of the *Sitzungsberichte* and the *Denkschriften* of the Vienna Academy of Sciences. But there are omissions in the case of papers published in the *Monthly Weather Review*. We note with pleasure the indexing under more than one subject-heading of papers which deal with matters which can be classified under different headings. Altogether the second issue is a considerable improvement over the first, and we do not doubt that the improvement will continue in future years.

R. DeC. W.

Choiseul und die Katastrophe am Korouflusse. By Dr. Willy Marcus. 79 pp. and Sketch Map. M. & H. Marcus, Breslau, 1905. (Price, M. 2.40.)

The complete story of one of the most tragic incidents in colonial history—the death of thousands of French emigrants who were induced to settle at the mouth of the Kuru River, northwest of Cayenne, in French Guiana, in the latter part of the eighteenth century. They were helpless and ignorant in a deadly climate, without proper supplies, and were left practically to their fate until nearly all had died of disease or hunger. The "Précis historique de l'expédition du Kourou" was published in Paris in 1842, but this is the first time that the detailed story has been told in German.

Durch die Libysche Wüste zur Amonsoase. Von Georg Steindorff. 163 pp., 113 half-tone illustrations, Bibliography and Index. Velhagen & Klasing, Bielefeld and Leipzig. 1904.

This addition to the "Land und Leute" series of geographical monographs is a popular account of the archæological journey made by Prof. Dr. Steindorff from Cairo through the Libyan Desert to the Siva oasis and return, in Nov., 1899–Jan., 1900 (BULLETIN, 1900, p. 680). It is one of the most valuable of the series, for it deals with a region of which much remained to be told, though several modern explorers have visited it; and long before the Christian Era the Greek city of Kyrene sent many caravans to Siva for the dates and salt of the Libyan waste. None of the recent travellers obtained such fine photographic results as the splendid views brought home by Dr. Steindorff and his companion, Baron von Grunau. They are reproduced in this volume, and give a very clear idea of the routes, oases, settlements, ruins, and desert aspects of this region. The extraordinary clearness of the atmosphere helps the photographer, and the results are exceptionally good.

Northern France from Belgium and the English Channel to the Loire, excluding Paris and its Environs. By Karl Baedeker. (Fourth Edition.) xxxvi and 423 pp., 13 maps and 40 plans. Karl Baedeker, Leipzig, 1905. (Price, M. 7.)

This work corresponds with the seventh French edition of this well-known handbook for travellers. There are large-scale plans of all the more noteworthy places which, with the maps, enable the tourist to ascertain his bearings in the towns and to select the most convenient routes through the country.

With the Pilgrims to Mecca. By Hadji Khan and Wilfrid Sparroy. With an introduction by Professor A. Vambery. 314 pp., 25 illustrations from photographs, appendix and index. John Lane, New York and London, 1905. (Price, $3.50.)

Burckhardt, Burton, Maltzan, Hurgronje, and others have described Mecca and the pilgrimages to it. Here is an addition to the list with a distinctive claim to attention, because it was written not by an alien and unbeliever, but by an educated follower of Islam. In the words of Professor Vambery: "We have been in need of just such an account of the pilgrimage written by a Mohammedan, not attracted by curiosity but by religious piety, who had every access to holy places, who was not hindered with the fear of being discovered as a Christian, and who is possessed of a shrewd observation."

The pilgrimage described is that of 1902, which is one of the largest yet counted. The author places the number of pilgrims at 220,000. When Burckhardt visited the

holy city in disguise he calculated the number at 70,000; Burton, in 1850, found the number reduced to 50,000. The author says a growth in tolerance among the Mohammedan sects is plainly evident, and this points to renewed unity among those races that hold the faith of Islam.

The narrative, absorbing in interest, is divided into three parts: the first describes the aspects of the social life and faith; the second, the journey to the holy city and the interesting ceremonies there, such as the compassing of the Ka'bah, the visit to Arafat, and the Day of Victims; the third section depicts various scenes in Mecca, phases of life there and religious institutions, such as the use of talismans and healing by faith. Mr. Sparroy, who was tutor to the children of the Shah of Persia over fifteen years, collaborated in preparing the book for the press and wrote the appendix, which discusses the condition of Islam in regard to slavery. The photographs were taken by the author—a proceeding by no means orthodox, and involving some personal risk.

Aus Südwest-Afrika. Blätter aus dem Tagebuche einer deutschen Frau, 1902–1904. 188 pp., and 24 half-tone Illustrations. Veit & Co., Leipzig, 1905. (Price, M. 3.50.)

These are bright sketches of life among the German pioneers and the natives in German Southwest Africa, with many allusions to the physical conditions of the country. The writer and her husband travelled over a large part of the central regions, where most of the German officials and immigrants are settled. She shows the vivid contrast between the sandy waste of the coastal zone and the mountainous interior, where the climate is inviting and the verdant valleys are beautiful. Life among the pioneer farmers is depicted, with its hardships and unexpected vicissitudes. The writer describes with pen and picture the achievements of some of these brave men and women who spread over bits of the wilderness the charm of utility and comfort. The pathos of their fate in the present Herero uprising, the tragic end of their twenty years of struggle, are, perhaps, nowhere else so feelingly emphasized.

Die Zukunft Deutsch-Südwestafrikas. Von Dr. Georg Hartmann. pp. 31. Mittler & Son, Berlin, 1904.

This colony, about a third larger than Germany, is, in the author's opinion, neither one of the best nor one of the least valuable of the steppe regions. In addition to its thirsty wastes, it has large areas adapted for cattle and sheep raising, and valleys where general farming is successfully pursued; and he points to Cape Colony, Algeria, Argentina, and Australia, all of which produce millions of live stock and great value in agricultural products under similar semi-arid conditions. The mineral resources of the colony are also very important. Dr. Hartmann believes that German Southwest Africa will richly pay for development, and that Germany may ultimately obtain from this source the wool which she so largely imports. He regards the two recent native uprisings as local phenomena, whose repetition may be prevented; and he thinks the next twenty years should see at least 10,000 to 15,000 families of German peasants, numbering 50,000 to 60,000 persons, settled in the colony and developing its agriculture and stock-raising.

Lettres d'Afrique du Colonel Baron Lahure: Maroc et Sahara Occidental. Préface par Edmond Picard. ix and 136 pp., portrait and 3 illustrations after water-colors by the author. Oscar Lamberty, Brussels, 1905.

Col. Lahure, an officer in the Belgian army, wrote these letters while on a Gov-

ernment mission in 1888 to northwest Africa, during which he saw much of Morocco and the western Sahara. He was greatly impressed both with the indications of large natural resources in Morocco and the determination of the governing class that foreigners should not profit by them. He wrote that, after great effort and the lavish distribution of money among influential persons at court, a mining concession might be obtained, but the Sultan would manage indefinitely to delay the enterprise or ultimately forbid any attempt to carry it out. Soon after his return home the author fell a victim to a malady contracted on this journey.

Vedic India, as Embodied Principally in the Rig-Veda. By Zénaïde A. Ragozin. xii and 457 pp., Map, 35 Illustrations and Index. G. P. Putnam's Sons, New York, 1902. (Price, cloth, $1.50.)

This book describes the thoughts and customs (chiefly religious) of the ancient Aryan settlers in the Punjab, and gives much space to geographic influences. It opens with a general description of India, emphasizing especially the influence that the Himalayas, the monsoons, and the variety of climate and vegetation have had upon the physical and mental development of the people. A brief description follows of the life of the Indo-Iranians, that greater and more numerous nation, lying somewhere in the interior of Asia, the ancestors of the Aryan Hindus and Iranians. This people, the author says, was "rude and primitive, but by no means what is usually understood by a 'very young people.'" The fact that the words *father*, *mother*, *brother*, *sister*, *widow*, etc., have similar roots (modifications being consequent on the character of the language), in almost all the languages of the Aryan stock, shows that these words existed in the language of the Indo-Iranians, consequently that they had reached the stage of family organization. In the same way it is shown that they tilled the soil, made stone weapons, used gold and silver, dwelt in houses with doors, and wore clothing of skin or of spun and woven wool. The presence of the word *cow* is of great importance, showing that they had reached a settled stage of existence, because the cow, unlike the sheep, is incapable of bearing the hardships of a nomadic life. Of equal importance is the absence in the Aryan languages of any common root for *sea* or *ocean*, indicating that these people lived in an interior land, knowing nothing of the ocean.

The early history of the Aryans, who separated from this ancestral stock, and, after long wanderings, settled in the Punjab of India, forms the subject of the book. Material is found principally in the Rig-Veda, a collection of 1,028 hymns and sacred texts. Miss Ragozin takes up first the cycle of the older Vedic gods, who can be traced with absolute certainty to an Indo-Iranian past, and identified with corresponding divine beings in the Avesta; then the myths and gods of Indian growth, bearing the unmistakable impress of the land, and conditions of life which the Aryans found beyond the Himalaya and the Indus. The nature of the country mapped out their chief pursuits ; agriculture, and cattle breeding, with some pottery, carpentering, hide-tanning, spinning, and weaving. The climate was balmy but not enervating ; the soil repaid labour, but would not support the race in idleness; there were wild animals to be kept at bay, and a brave and numerous native population to be defied. All these conditions were favourable to the development of a sturdy race.

The author cites evidence, almost conclusive, that there was commercial intercourse between Dravidian India and Babylonia. One of the facts pointing in this direction is that the old Babylonian name for *muslin* was *sindhu*—*i. e.*, it was called by the name of the country which exported it. This is corroborative evidence that the

Aryan settlers of Northern India had already begun to excel in the manufacture of muslin, and that their Dravidian contemporaries were enterprising traders; it was certainly not the Aryan export trade which supplied the foreign markets with it, for the Aryans of the Punjab were acquainted neither with the sea nor with the construction of sea-going ships; it was the Dravidian traders who collected the surplus left over from home consumption, the goods then finding their way to some commercial centre on the western coast, where the large vessels lay which carried on the regular export or import trade.

The author points out that the very first hints of the caste system are found in the Vedic period, though it did not develop until the later Brahmanic period. Funeral, marriage, and sacrificial rites are described with fulness, and finally the cosmogony and philosophy of the Rig-Veda. Frequent extracts from the Rig-Veda add greatly to the interest of the book.

Mediæval India under Mohammedan Rule, 712-1764. By Stanley Lane-Poole. xviii and 449 pp., 59 illustrations, and index. G. P. Putnam's Sons, New York, 1903.

Buddhist India. By T. W. Rhys Davids. xv and 332 pp., 56 illustrations, and index. G. P. Putnam's Sons, New York, 1903.

These two books, as well as "Vedic India," reviewed above, are in the well-known series of the "Story of the Nations," now far advanced. Mr. Lane-Poole is Professor of Arabic in Trinity College, Dublin, and Dr. Rhys-Davids is Professor of Pali and Buddhist literature in University College, London. Both gentlemen are recognized as leading authorities on their special subjects, and their volumes in these series illumine the historical phases of India of which they treat.

The Blue Book of Missions for 1905. Edited by the Rev. Dr. Henry Otis Dwight, Secretary of the Bureau of Missions. 242 pp. and index. Funk and Wagnalls Company, New York and London, 1905.

This is a compact directory of American and foreign missionary societies, showing the distribution of their work over the whole mission field. It describes the fields in alphabetical order, giving area and population of countries, with their religions, estimated or ascertained, number of adherents of each faith, missionary societies, number of churches, schools, etc. ; also the largest cities in the mission fields, with population, a review of the missionary situation throughout the world, an enumeration of the Protestant missionary societies, with their statistics and aims, and many notes and tables, including a list of the Roman Catholic societies, and much information important for those who write about missions or have relations with them.

From a geographical point of view this compilation is important. Some of the best annuals giving geographic statistics attempt to show the distribution of religious faiths among each people. Their tables, however, are very defective, because of the inadequacy of information. This book is evidently inspired by an earnest desire to present accurately facts and figures showing the condition and progress of missionary work. In future editions it may be possible to remedy a few defects apparent in this issue. In all cases, of course, the best authorities should be consulted for areas, population, etc. The book gives the estimated population of the Congo Free State at 30,000,000, which is a common but a great exaggeration. The best approximation of the population now given (*Geographen-Kalender*, vol. 1) is 14,000,000.

BULLETIN

OF THE

AMERICAN GEOGRAPHICAL SOCIETY.

Vol. XXXVII **1905.** **No. 6**

THE GREAT ROADS ACROSS THE APPALACHIANS.*

BY

ALBERT PERRY BRIGHAM.

Few conditions in commercial geography are so unquestioned as the close relation of Western New York to the city at the mouth of the Hudson. We teach it to children in the grades as part of the alphabet of human geography, and scarcely think of the Genesee country as having an outlet to the sea save by the Mohawk valley. Yet the long fingers which the Lehigh and Pennsylvania railway systems have extended into central and western New York recall views of a very different sort that were held but little more than a hundred years ago.

A traveller who saw the lake country of New York in 1792 only followed the fashion of those days in his enthusiasm over the water connections of that region. There were routes by the Genesee and Seneca Rivers to Lake Ontario and Quebec. And one could go by the Tioga (now the Chemung) and Susquehanna to Philadelphia, Maryland, and Virginia, a canal already being projected between the Susquehanna and the Schuylkill. The old writers did not indeed forget the route by Wood Creek and the Mohawk to Albany, but they thought that after home needs were met the surplus would find its best market in Philadelphia. As late as 1804 Robert Munro, in his description of the Genesee country, voices this thought of a Philadelphia market.

These views were no new thing—in fact, they might be called ancient even in 1804; for in 1687 Gov. Dongan, in his report on the Province of New York, had been anxious about the beaver and

* This paper was read before the Association of American Geographers, in Philadelphia, December 29, 1904.

peltry trade, and informs their lordships that in the previous year the Indians brought 200 packs of beaver "down to the Skonshill," and were likely to bring more in the year of his writing, "which, if not prevented, his Majesty must not expect this government can maintain itself, besides that it will wholly depopulate both this town and Albany." Thus anxiety to save the supremacy of New York is by no means confined to the beginning of the twentieth century.

The southern route for the Genesee country was no mere theory in those days. The opening of what was then thought a tolerable road across the mountains of Pennsylvania, by the Susquehanna gateway, had lured explorers and aided in the settlement of the lands. It was thought a marvel that a number of persons who had passed the age of sixty had easily made the journey in seven days from Baltimore to Bath, in Steuben County. And much freight was carried. Rude but strong craft, known as "arks," were gotten in readiness for the melting of the mountain snows, loaded with two to five hundred barrels of flour, and piloted by a small crew down the swollen streams to Baltimore, where the cargoes were sold, and likewise the boats, designed for one voyage only, were broken up for the lumber that was in them.

Nor was the outlet of the St. Lawrence forgotten. While Baltimore was the "natural seaport" of the Steuben country, beef, salt, pork, flour, and whiskey were shipped to Canada; and Cadwallader Colden, in his memoir on the completion of the Erie Canal, refers to a time when it was common talk that the State might be divided along the line of its mountains, Western New York being tributary to Montreal.

When one stands on the public square of the quiet little city of Hagerstown, in Maryland, and looks down each of the four comfortable avenues that lead out from it, it would scarcely occur to him that he would be going out into the wilderness should he visit Rochester, on the lower Genesee. But so they thought of Colonel Rochester in 1802 when, at sixty years of age, he organized a family caravan, and passed out of Hagerstown between long lines of sorrowing neighbours to make his home in the wilds of Western New York. He and others had squandered $1,750 upon a hundred acres of land at the falls of the Genesee. A good part of the tract was swamp, and Rochester was asked if they were starting a park for deer, bears, and raccoons, or if, perhaps, they were going to make "rattlesnake gall pills." But he and his partners seemed to have prophetic faith, and proceeded to lay out the great "four corners"

of the present noble city. Thus Rochester had its lineage from the south.

But meantime the eastern outlet was not forgotten, and navigation from the lakes to the Mohawk was improved until ten-ton boats could go to Schenectady. In 1788, Elkanah Watson dared think that New York could dig canals and thus divert the trade of the lakes, not only from Quebec, but also from Alexandria. The idea of staid old Alexandria, which most of us know as the incident of a trip to Mt. Vernon, competing for the trade of the Great Lakes is quite impossible to modern consciousness. But it was not so to Watson, nor was it so to Washington, whose most persistent thought, after the freedom of his country, was certainly the focusing of the West upon the Potomac River and on the soil of his beloved Virginia. But Watson has no idea of allowing New York to sit by while Washington attracts the peltry of Detroit to the marts of Alexandria.

Another student of these early industrial conditions, writing in 1808, conceded no future rival to New York save New Orleans, and believed that within a hundred years its island would be covered with buildings. His vision was thus equal to Manhattan, but fell short of Greater New York. Buffalo, also, he pictured as exchanging its forest for a thicket of marine spars. With reference to Albany, however, his fancy carried him somewhat afield, for he thought her hills must be cut down and her valleys filled, to "give spread" to her population.

During the last decades of the eighteenth century the pioneers traced with delight the network of inland streams and lakes. They put the emphasis on the extent of this "navigation," to use their favourite word; we should put it upon the number and length of the carrying-places, upon the shoal waters and endless windings of the Mohawk and Seneca, upon snags and fallen trees, upon fleas, mosquitoes, execrable taverns, and high freight charges. But for the development of a new empire, as the enthusiasts of that day were wont to call the land, the necessities of life were fewer than now.

Doubtless the sturdy immigrant coming up the Hudson would conquer with equanimity the sixteen miles of sand hills and pine barrens which still interpose a half desert between Albany and Schenectady. Then by diligent use of poles he would come up to Little Falls, and would esteem the transfer short over the rocky banks to the placid waters that mark the local base-level thence to Fort Stanwix. There he would consider it nothing less than the work of a wise Providence that a short portage across level ground

would bring him and his goods to Wood Creek and the basin of Lake Ontario.

Parkman has somewhere given a poetic description of the canoe voyager borne peacefully down the winding waters of this little stream, beneath the shading arch of interlocking forest trees. The real journey seems to have been more prosaic, not to say exasperating. Mr. Watson, who went West by this route in 1788, says that in September, when the water was low, the bateaux were commonly hauled up the creek by horses, which travelled in the water, and not infrequently the descending boats were navigated in the same

MILESTONE ON THE LINE OF BRADDOCK'S ROAD NEAR FROSTSBURG, MARYLAND.

way. The crooks and turns were "innumerable," and the trees had in them more than poetry, for a big and lazy glutton was knocked off from one of the boats by a limb and got a dangerous ducking.

After Oneida Lake and its outlet were passed the voyager could go down to Oswego, or thread his way through the mazes of Seneca River and its tributaries to Geneva, or Canandaigua, which had become places of importance long before the days of Syracuse, Rochester, and Buffalo. It was regarded as a vast gain when, in the years 1795–1797, the short canals gave the first concrete prophecy

of what was coming thirty years later. At Little Falls the rocks yielded to the sturdy hand of the pioneer for a distance of two miles. Five locks were built, and the ascent and descent of forty-two feet were made without breaking bulk. Another canal was dug at Fort Stanwix, across the Oneida Carrying Place, making an unbroken passage between the Hudson and the waters of Ontario. The flour and potash of western New York and the product of the salt springs could now be sent to the Hudson in ten-ton boats and exchanged for the products of the seaboard. A writer, probably of date 1804, records that one hundred boats had been known to draw up at Geneva within a period of six weeks. In 1790, John Post, the first merchant of Utica, had removed from Schenectady to the ford of the Mohawk and begun a successful career as storekeeper, dealer in real estate, and promoter of commerce and travel by the Mohawk River. By boat he exchanged products with Schenectady and the East, erected a three-story warehouse near the Genesee Street crossing, and finally fitted out three stage-boats with seats and oilcloth covers for those who preferred a water journey to rocks and mud between Utica and Schenectady.

Meantime, for years immemorial, there was travel along the Mohawk bottoms. That the river and the flood-plain offered but a choice of evils we can know very well from Watson's vigorous references to his journey in 1788. He had found an "infamous bad carriage road" between Schenectady and Johnstown, and when he resumed the line of the river from the latter place he was in doubt about going on and let his horse decide whether to go up the valley or to return. He suffered from hunger on the site of Utica, forded the river, got green corn and salt from a crusty German woman in a cabin, and was scared by drunken Indians on the battlefield of Oriskany. He pronounces the road system a disgrace to so fine a State, and avers that his driver rattled over the stones as if the devil was at his heels, while he crept over smooth roads as if on his way to a funeral.

It was five years after this journey when the Government established the first mail route between Canajoharie and Utica. The distance was fifty miles; the mail was carried on horseback, and the rider was allowed twenty-eight horses to make the trip in either direction. Some time in the year 1793 or 1794 the great western mail from Albany brought six letters for Old Fort Schuyler (Utica). It was an event, and the gossips of the little town were slow to believe it until the Dutch postmaster, John Post, already in our acquaintance, told them it was true.

A new epoch of land travel began with the building of the Genesee Road through central and western New York. This was variously known as the Great Genesee Road, or the Ontario and Genesee Turnpike Road. It extended from Fort Schuyler to Geneva—a distance of one hundred miles. It was laid out six rods wide, and it was required that a strip four rods in width be cleared and improved. Through swampy tracts, which were abundant in this plain land in the days of forest, gravel and logs were used. It was felt that rapid transit had been won, for "whereas the road was like an Indian path in June (1797), on the last day of September a stage left Fort Schuyler and came to Geneva and left its four passengers in the afternoon of the third day." Genesee Street in Utica and Genesee Street in Syracuse are parts of this ancient road. Down to this time fording had been the usual means of passing the Mohawk at Fort Schuyler. Now, by a law passed March 28, 1797, a large sum was raised by lottery to benefit roads in various parts of the State. The sum of $2,200 was assigned for the improvement of the Genesee Road, and of this amount John Post and others received $400 for building the first bridge at the foot of Genesee Street.

Other thoughts than considerations of utility came to the minds of some, even in those rugged days: Timothy Bigelow, in his tour of Niagara in 1805, arrived at length at that rocky gateway which has ever interested physiographers, geologists, and the common traveller as well—Little Falls. Mr. Bigelow did not give the people of that defile credit for morals or religion, for they swore much, and—perhaps worse than that—they well knew that Adam was not the first man, or else he was more ancient than the Scriptures say, because it must have taken the Mohawk more than five thousand years to break through at that point. Neither the traveller nor the settlers were disturbed by questions of faults, glaciers, or ancient cols, having, doubtless, their appropriate perplexities without assuming others that they knew not of.

The same traveller observes the red earth, the waste of the Salina shales of the geologists, and likens it to the soils of the "red freestone" region of the Connecticut Valley. Geneva, on the shore of Seneca Lake, was the metropolis of this western region, whose soil and climate were beginning to attract the thousands who soon made the Genesee Road a well-beaten way. Others than Bigelow indulged in moral reflections, for it was believed that a Scotchman who had built a "very respectable brewery" at Geneva

was likely thereby "to destroy in the neighbourhood the baneful use of spirituous liquors."

William Darby, in his tour of 1818, describes Geneva as built upon a delightful site, in view of the lake and commanding its opposite slopes with their forests and farms, and looking out on the farm-houses to the north, which stood "in an ocean of plenty."

It is no purpose of this writing to relate the familiar history of the Erie Canal, which was then in construction, and commonly known as the Western Canal. But it is not easy, at nearly a century's remove, to know that the zeal for rival centres of commerce was then as keen as it is to-day. Darby sets himself to answer the queries of the New York Association for the Promotion of Internal Improvements. One of these questions pertained to the advantages of New York over New Orleans in the trade of the country northwest of the Ohio River. With the Canal he was sure the capital of New York could overbalance the superior local conditions of New Orleans and keep her supremacy forever. He then describes, in language as true to-day as it was eighty-seven years ago, the resources of the region bordering the lakes. Darby quotes from the Albany *Argus* the preference of Western merchants for New York, on account of better assortments and prices, but admits that their trade went largely to Philadelphia and Baltimore, because of their better connections with the West. We must remember that the Conestoga freighter, running over the best roads in America, was then in its glory. Four routes between New York and Pittsburg were advertised, running variously by Albany and Olean, Albany and Black Rock, Albany, Oswego and Black Rock, and Albany, Sackett's Harbor, and Black Rock. These are strange sounds in these days, for the completion of the canal a few years later destroyed the importance of several of the lines.

Clinton's memorial to the Legislature of New York is one of the best tracts ever written upon the advantage of swift and direct transportation, even though we of this day understand with difficulty the *swiftness* of canal traffic. But in appreciation of the special opportunity of the Empire State, in discussion of rival routes, in seizing the experience of the past, and in prophecy of the social and commercial advantages to be won, the memorial reads as if written in the full light of the nineteenth century.

The volume describing the celebration of the finished waterway tells as no other writing tells the motives and the joy of the men of that day. We need to free our minds from the thought of an Empire State Express between New York and Buffalo, with hours

to spare in the sunlight of a summer's day, and pass from the mud and dust and wayside taverns of the Genesee Road to the jaunty packets of the Erie Canal. We must remember the advance in price of Genesee wheat, the easy carriage of merchandise from the seaboard to the lakes, and that these boons followed within a dozen years of the time when it did not cost more than half as much to make a cannon as it did to carry it from Albany to the Lakes.

The first earth was turned for the canal at Rome, July 4, 1817, and eight years and four months later the first boat entered from Lake Erie, bound for the Atlantic Ocean. Signal cannon stationed at proper intervals throughout the five hundred miles offered the nearest approach of that day to telegraphic communication. Jefferson, who had sent Lewis and Clark across the mountains, had

TOLL-HOUSE ON THE NATIONAL ROAD, NEAR BROWNSVILLE, PA.

scouted the building of the Canal as a project that might be considered a hundred years later, and the farmers along the route had laughed at the engineers as they planted their stakes in the fields and swamps. It was said that the ditch could not be made to hold water, and as usual in great deeds the faith of the few atoned for the doubts of the many. Fortune favoured the makers, for water was ample in the adjoining highlands, the grades required no such forbidding array of locks as were needed by the other great canals of the period, and by opportune discovery "meagre lime" was found at hand to serve as hydraulic cement in such locks as were required. At every town there was a festival, speeches were made, feasts were eaten, and we read that at Albany an "eloquent peti-

tion was made to the Throne of Grace by the Reverend Mr. Lacey." The cannon salute was received from the west at Albany at 11 A. M., was heard at Sandy Hook at 11.21, and was repeated back to Albany by 11.50.

Two casks of lake water were brought from Buffalo, and at New York a fleet formed an "Aquatic Procession" and proceeded to Sandy Hook, where, with due ceremony, DeWitt Clinton poured out the water and wedded the lakes and the sea. Possibly more to the point were two barrels of apples, raised in the orchard of Judge Porter at Niagara Falls, placed on one of the craft as samples of western fruit, and presented, one to the corporation of Troy and the other to the corporation of New York.

The influence of the making of the Western Canal was enormous. Darby gives his opinion of it when, far to the west, he observes how much nature has done to communicate across the site of Chicago, between the lakes and the south. He thinks the Government should complete Nature's work; nor should it hesitate at three hundred rods, while New York digs three hundred miles. The ditch could be dug, he thinks, in the time required by a long-winded member of Congress to make a speech against its constitutionality.

The success of the Erie Canal urged on the construction of the Pennsylvania Canal, and was likewise powerful in Massachusetts, where it was little less than galling to see the rich products of the west turned aside at Troy and floated down to the mouth of the Hudson. The path to Europe through Boston was thought to be more direct, and it must be opened. Hence here also canal schemes followed close upon the building of the westward turnpikes, and in 1825 the Governor of Massachusetts, by his message, secured a commission of inquiry. The Deerfield Valley was followed, and it was proposed to dig a tunnel near the place of the present Hoosac Tunnel. It is somewhat diverting to read that they thought the tunnel would cost the sum of $920,832, and one writer demonstrates that it would take fifty-two years to make the opening through the mountain. But the tidings of engines moving on railways changed the current, and soon the legislature was inquiring in that direction. The Boston and Albany line was the fruit of this fresh discussion, and finally the Deerfield and Hoosic Valleys determined another western road out of New England, both, however, converging on the opening of the Mohawk Valley. Dire consequences were foretold, from the building of such new-fashioned roadways, and Mrs. Alice Morse Earle quotes from the Boston *Courier* of

1827 the opinion that, even should the track be laid, it would be as useless as a railroad from Boston to the moon.

It is not to be understood that the men of the Delaware and Chesapeake basins conceded the superiority of the Mohawk gateway; nor has the New Yorker an undisputed claim to-day, when the Pennsylvania Railroad, already one of the greatest in the world, is expending its millions to make transportation yet more swift, safe, and luxurious. The gardens and rich fields of the Pennsylvania lowlands were well subdued while yet the lake plains of New York were covered with forests. It is no new country that one crosses between Philadelphia and the Susquehanna River, and the strongly-built stone mansions and the great barns with long and low-sloping

HAMBRIGHT'S HOTEL, ON THE PIKE, THREE MILES WEST OF LANCASTER, PA.

roofs on one side and "overshoots" on the other tell the story of generations of industry and of the rewards of fertile soil. Over this land ran the Lancaster Pike, which crossed the Susquehanna River at Columbia, and thence by Carlisle, Shippenburg, and Chambersburg led to Bedford and Pittsburg. West of Bedford it was the Old Glade Road, begun at the instigation of Braddock, and soon after this unfortunate soldier's death completed to Pittsburg by John Forbes, whose name it often bears. In any review of Appalachian highways this must have equal honour with the thoroughfares of the Mohawk and Genesee, for it was the first great road from the Pennsylvania seaboard to the Ohio Valley, and may be regarded as the ancestor of Pennsylvania's greatest railway sys-

tem. It follows, as Hulbert has pointed out, the high ground between the valleys now occupied by two trunk lines of railway. From Philadelphia to beyond Chambersburg it has to this day been an important road, and must ever be, because of the rich country through which it runs. Across the mountains and the western plateau it is like Boone's Wilderness Road—its interest is historic. And this element never fails, for stone bridges, solid old taverns with wide chimneys, and quaintly fashioned toll-houses remain as marks of former greatness. Most of the men of this day seem to have forgotten the past. The writer alighted from the Cumberland Valley train at Chambersburg and inquired of an elderly resident if any old road-houses or toll-gates on the "Pike" were within walking distance in the three hours between trains. His answer was negative, but a walk was taken, nevertheless, to discover within a mile of the public square, going west, an ancient toll-house, a venerable hotel (made commonplace by a degenerate modern bar), and the tall wooden pump with its long and broadly-curved handle of iron.

Where the road crossed the Susquehanna at Columbia is now a bridge, used at once for the passage of pedestrians, wagons, and railway trains. It is but a single narrow road, and the entrance of vehicles, whether moved by beasts or by steam, is controlled by telegraphic communication between the ends of the bridge. This feature can hardly be better than in the old days, though the electric transit into Lancaster is doubtless swifter and more comfortable than the stages of a hundred years ago. And the Conestoga freighter, here in its home, has gone to decay, although the boat-shaped box may still be sometimes seen on the neighbouring farms. The Pike contributes two well-built streets to Lancaster, east and west from the public square, and, going east, the road is carried across the Conestoga Creek, which not far away joins the Susquehanna.

The great focal point west of the mountains in early days was Pittsburg. Here two rivers converged, and hither land routes tended, not merely from Philadelphia, but, as we have seen, from New York and Albany, and, as we shall see, from the Potomac also. The final route in Pennsylvania was to follow the valleys rather than the uplands, and the early improvement of navigation in Pennsylvania took much the same course as in New York. The Schuylkill, Susquehanna, Juniata, and the Conemaugh pointed out Nature's highway to the West. The State had its society for the betterment of roads and navigation as far back as 1791, several years before the Inland Lock and Navigation Company built the short

canals of the more northern State. Indeed, the completion of the Potomac line was felt at that time more keenly than that of the Mohawk, and yet the Pennsylvanians had no sort of doubt of being able to control not only much of the Ohio traffic, but the Great Lake trade as well. They did not appreciate the fact that they must surmount altitudes more than four times as great as those of the pass of the Mohawk.

By 1834 canal traffic was open from Philadelphia westward to Holidaysburg, and from Pittsburg eastward to Johnstown. Between Holidaysburg and the town on the rushing Conemaugh lay thirty-six miles of country constructed in one of Nature's own ways and with slight reference to the schemes of migrating, trafficking human creatures. To read early accounts one would suppose the Allegheny front to be a belt of mountains piled like the Alps. But while the hills are rounded, and mantled even yet in great measure by forests, their altitude is respectable, and their more than two thousand feet put navigation out of the question. The problem was solved by building the Portage Railway with alternating levels and inclines. Boats were floated upon cars at the water terminus and drawn by locomotives and stationary engines over the summit and deposited in the waiting waters on the east or west. After a time the summit was abandoned, and power was saved by carrying the road through the earliest tunnel in America. The prosperity of the stage and the Conestoga wagon was shattered, as the reign of the dirt road had passed in New York in 1825. The day of the canal and of the portage was short, for the Pennsylvania Railway Company was chartered in 1846; and in 1854, or twenty years from the beginning of continuous boat traffic, there was unbroken railway communication from the Delaware to the Ohio.

Narrowly separated from the Pennsylvania routes are the passes followed by the Potomac and its branches. Up this river were natural lines of communication for Maryland and Virginia with the Ohio Valley and the lakes and prairies lying beyond. Thence early Virginia was supposed to extend, and hence both nature and history may well have convinced the Virginian, and such an ardent Virginian as Washington, that the ancient colony, later become a State, was the natural heir to the commerce of the new domain beyond the mountains.

Nor was Maryland to be left out, for she held the north bank of the Potomac and began to enact road laws in 1666. She built "rolling roads," along which two men could tumble great casks of tobacco into Annapolis, and her endless tidal inlets made many

ferries necessary. Numerous "Joppa" roads gave a hint that that mart of tobacco yielded its precedence to Baltimore because of the better geographical conditions of the latter. The Monocacy Road early joined the western parts of the State to Philadelphia, and thus the progress toward the mountain-belt and across it was a natural evolution. The Ohio Company was founded to trade with the West, and this idea fully materialized in the final building of the National Road.

Thus we are brought down to familiar names, for Christopher Gist was commissioned by the Ohio Company in 1749 to explore the routes leading westward. Going up the Potomac, he would come, as many a prehistoric hunter and fighter must have come, to that splendid water-gap which has been cut across the mountain by Wills Creek, where Fort Cumberland was soon built, and where the busy City of Cumberland stands to-day. Ignorant of history must he be who stands under the walls of that splendid notch and does not thrill at the sight of the swift stream, the National Road and four lines of railway passing through in their close parallel courses.

Two years later Thomas Cresap, aided by the Indian Nemacolin, undertook to lay out a way to Pittsburg on the Ohio, and soon followed Washington's mission to Ohio and the widening of the Nemacolin path, to which the name of Braddock's Road has been given. What sort of a road Washington and his men could make through leagues of forest and mountain Braddock found to his cost as he sought to ride over it in the chariot he had been bent on buying at Alexandria. Satisfied at length, as he crept with a snail-pace of three or four miles a day, that Washington knew the land better than he, he discarded his carriage, sent back many wagons, and packed his supplies for the further journey toward the Ohio and his foes. But a half century was to pass before the Potomac and the Monongahela would see an adequate highway. So late as 1807 Gallatin's report on turnpikes contained a representation by Jonathan Ellicott of the Baltimore and Fredericktown turnpike, that a gap of 74½ miles separated the road of his company from the proposed Government pike leading west from Cumberland.

This link was at length built, and the National Road was brought to completion between the dates 1811 and 1818. This road the writer has seen for sections of a few miles each at certain important points, but he believes that the student of American geography and history would be well rewarded by devoting a month of time to traverse it. Let him begin by the tidal waters at Baltimore, pass

to Frederick, Hagerstown, and Cumberland, and there take up his journey over what is properly the National Road, through its seven hundred miles from the heart of the Appalachians to the heart of the prairies. He may not learn many specific facts that he cannot gain from books, but he will see with his own eyes a kind of cross-section of the eastern United States; he will know its great units of topography—plain, mountain, and plateau—until he comes to lowland again; he will see types of industry, the decay of the old and the growth of the new, while every arched bridge of stone, every toll-gate and battered road-house, will speak to him of a period of enterprise and power not less wonderful for the opening

BRIDGE ON THE NATIONAL ROAD OVER WHEELING CREEK, FIVE MILES EAST OF WHEELING, W. VA. THE MONUMENT IS ON THE GROUNDS OF THE CRUGER MANSION.

years of the nineteenth century than the things we see at the beginning of the twentieth century.

The National Road is the most complete and tangible result of that widespread interest in communication which prevailed among common men and among American statesmen during the first decades of that century. No similar enterprise was so large, so fully completed, or so largely useful.

The specifications for its building were included in the Act of Congress which ordained it. The road was to be four rods wide, raised in the middle with proper material, such as stone or gravel, and the grade must be low. The traffic upon it was enormous, and the procession of gay passengers, of the United States mails, and of imposing freight wagons probably created an impression on eye-witnesses not inferior to that now made by a four-track trunk rail-

way in this time, when we are somewhat hardened to the sight of great things. Mr. Hulbert's volume (he entitles it the Cumberland Road) will be enjoyed by those who would read the story in detail. It will be observed that this typical Potomac route, as we may incline to call it, does not touch the soil of Virginia, but passes from Maryland up into Pennsylvania to Uniontown, crosses the Monongahela River at Brownsville, comes down to the Ohio River at Wheeling, and runs thence to Columbus and the Mississippi country.

Some things point to a better appreciation of earth roads then than to-day. In 1818 one of the Maryland Governors, in his Message, condemned the locking of wheels, recommending a chain and shoe, and he proceeded to say that "The great scourge to a turnpike road is the narrow wheel, which should be made the subject of legislation." The importance of wheels was recognized in the administration of the National Road, for wagons having tires above a certain width were not subject to tolls.

There was democracy of travel in those days, and the average man, if he could pay the fare, rode with millionaires (if such there were) and with statesmen, of whom there certainly were some, going and coming between Washington and the West.

A somewhat famous iron bridge crosses Dunlap Creek, close to its entrance upon the Monongahela between Bridgeport and Brownsville. It is on the line of the National Road, and it is tradition in Brownsville that Henry Clay was, on one of his journeys, overturned in the bed of the stream, and that he gathered himself up with the remark that Clay and mud should not be mixed in that place again. The rest of the story is that soon after his return to Washington there came unsolicited the order for this iron span, carrying the road high above the stream. The great Kentuckian was certainly in no danger upon the great covered wooden bridge over the Monongahela, which seems as staunch as ever, and whose massive timbered arches seem good for another century.

The Chesapeake and Ohio Canal and the Baltimore and Ohio Railway were the natural successors to the National Road. The ardent passion for waterways and railways began to prevail at about the same time as in New York; for the Canal was chartered in 1823, and the railway but three or four years later, coinciding well with the corresponding strides in communication in New York and Pennsylvania. The ditch was intended to join not only the Ohio, but also the Lakes, to the Chesapeake. Perhaps it was prophetic that President Adams, in sinking the spade for the first turn-

ing of earth, hit a root and was obliged to doff his coat and bend lustily to his work; for the making of the canal was long and toilsome; it was never dug farther west than Cumberland, and this goal was only reached in the autumn of 1850. More than a quarter of a century had been consumed while the Erie Canal, far greater in length, had been finished in eight years. The Chesapeake Canal has been a burden to the State, and now, after its four-score years of halting construction and scarcely profitable use, has passed, for a comparatively insignificant consideration, into the hands of the Wabash Railway Company.

The railway, however, as with the rail routes of New York and Pennsylvania, has become the great Potomac avenue of transportation, sending its long branches to Pittsburg, to Wheeling, and farther down the Ohio, all being outgrowths of the single trunk which leads up the Potomac, following its magnificent valley as far as Cumberland before divergence. And the traveller follows the majestic meanders, incised deep into the ancient plateau, and looks across upon the ditch, the subject of so much thought and outlay of money, and falling so far short of the brilliant hopes founded upon it. The railroad of the first years was important more as a prophecy, for horses, and even wind and sails, were the precarious motive powers that led up at length to the powerful locomotives that now climb up the highlands on one side and go comfortably down on the other.

We have reviewed the New York, Pennsylvania, and Potomac lines of communication. Other routes have been found, but these are the three great avenues from the Atlantic directly crossing the eastern highlands from the seaboard to the lakes and the Mississippi. It remains to cast our eyes upon another route equally historic, which runs along the mountain axis, and crosses the belt of uplands far to the south. We have seen how the Hudson from the north gate of the Highlands to Albany is a section of the New York route to the West. The physiographer follows this same valley past Allentown, Reading, Harrisburg, and Chambersburg in Pennsylvania, and recognizes it as the Hagerstown Valley in Maryland, the Shenandoah or Valley of Virginia south of the Potomac, and the valley of east Tennessee, in the region about Knoxville and Chattanooga. It is not a valley of the ordinary type; it is not due in the usual degree and manner to the action of streams, but results from the denudation of upturned strata, and is bordered by the Blue Ridge and its equivalents on the southeast, and by the faces or escarpments of the great plateau on its northwest side. The

lines of migration passed from the Delaware to the Susquehanna, from the Susquehanna to the Potomac, thence up the Shenandoah along the head branches of the James and down the long water-courses of the Powell, Clinch, and Holston to the Tennessee.

Immigrants found a well-trodden route into the Great Valley by way of Lancaster, from whence they would go to York, Hagerstown, and, crossing the Potomac, would pass, by way of Martinsburg, Winchester, and Staunton across the New River to the head-waters of the Tennessee. It was easier to push southwest along the valley and occupy its fertile lands than to break across the

CUMBERLAND GAP FROM THE EAST.

mountains into the wilderness of the plateau in Pennsylvania and Virginia.

The migrations of Daniel Boone may be taken as typical of the movements of his time; for he was born by the Schuylkill, and after getting his wilderness training in the woods of Pennsylvania, went with his family by way of Harper's Ferry and the Valley of Virginia to the far Southwest. There, however, he first turned to the basin of the Yadkin, until, after some years, in 1769, he recrossed the Blue Ridge, crossing also the streams and minor

ridges of the Great Valley, until he came to the Cumberland Gap, at the point where Kentucky and Virginia corner upon Tennessee. Few other points in the United States hold so much interest to physiographers and the historian as this. South and east from the Cumberland Range are the rolling and rich acres of the Valley of East Tennessee. To the northeast the range forms the rugged boundary between Virginia and Kentucky. To the southwest it runs on into Tennessee. Across it, to a depth of one thousand feet, is cut a V-shaped notch, the Cumberland Gap. Beyond is a broken valley a few miles wide, and then the Pine Mountain runs parallel to the Cumberland Mountain. Opposite the Cumberland Gap in Cumberland Mountain is the Pineville Gap, in Pine Mountain, and through the latter the Cumberland River finds its way out of the intermediate valley to make its course through the rugged plateau of Kentucky.

North from the Cumberland Gap are the frowning steeps of the Pinnacle, whose summit is covered with Confederate earthworks, and affords the traveller a magnificent outlook across the Great Valley, and over the broken profiles of the Great Smokies of Tennessee and the Carolinas.

A notch one thousand feet deep in a small range of mountains is not in figures an impressive feature. A villainous road still rises on the east several hundred feet, to reach the summit of the pass. But it was the one convenient point of overflow to the Blue Grass Region and the Ohio River, and it was directly opposite Pineville Gap. The Indians had trodden it for long; Walker and Gist had climbed through it many years before Boone's journeys to Kentucky, and the tides of travel that found the Gap before the end of the eighteenth century were ceaseless. Hence it marks the most famous point on one of the most famous American roads, a route variously known as Boone's Trail, the Caintuck Hog Road and the Wilderness Road.

The story of this road is told by Hulbert in Volume 6 of Historic Highways, and the reader will find a vivid picture in the closing chapters of James Lane Allen's Kentucky Blue Grass Region. It is in the heart of the country of the mountain white, and has yet its share of feuds and shootings, which comport strangely with such modern towns as Middlesboro, just inside the Cumberland gate and Pineville, in the Pineville notch. A college stands in the Great Valley, within a half hour's drive of the Gap, the mountains and the plateau are rich in coal, and a tunnel with two lines of railway carries the traveller several hundred feet

beneath Boone's ancient trail. The old and new are strangely blended in this land, and the visitor, according to his bent, can with equal facility look only at the new or altogether at the old, measuring the coal seams and building roads, or seeing in meditative vision the silent procession of men, women, and children who conquered the Ohio River and made possible the Louisiana Purchase and an American empire on the Pacific.

NOTES FROM THE DIARY OF THE LATE FRANCIS H. NICHOLS IN CHINA.

These Notes describe the passage through the Yangtze Gorges and the land-travel to the City of Tachienlu, where Mr. Nichols lived for months, preparing himself for the Tibetan journey which he was never to make. Turned back in Eastern Tibet, he went by way of India to Gyańgtse, where he died.

Chinese names and words are spelled as in the Dairy.

July 29, 1903. At eight o'clock this morning I left Ichang for Chunking, about 480 miles farther up the Yang-tze. Three miles beyond Ichang the gorges of the Yang-tze River begin. From Ichang to its sources, 1,000 miles to the westward, the river is confined between mountains and high cliffs. The compression of this vast body of water causes an exceptionally swift current, with swirling whirlpools. The numerous rocks, too, in the river-bed cause a succession of rapids, which make navigation at all times difficult, slow, and hazardous. But these conditions are now accentuated by the recent rise of the water in the river. During the last three weeks the water has risen forty feet at Ichang, and I am informed that the rise at Chunking is 100 feet. The speed of the current has increased proportionately with the rise of water. For hundreds of miles the river runs with the force of a mill-race. As a result the usual junk traffic is almost suspended, and this part of the Yang-tze is practically devoid of boats of any kind.

For me, however, a river voyage is necessary. In order to have as much time as possible on the Tibetan border I must hurry through this stage of my journey.

My boat is a species of junk called a *Wupan.* The literal translation of wupan is *five boards*. After the fashion of the smaller craft of China, a wupan receives its name from the number of angles in its hull, just as the one-oared *sanpan* is so called because its *lines* are three in number—two in its sides and one across its broad stern. My wupan is twenty-five feet long and has a beam of about eight feet. Like all Chinese boats, it is built in compartments divided by bulkheads. Although intended for carrying freight, the wupan is adapted for carrying passengers by a roof of matting stretched over posts lashed to the sides.

Over the wupan's stern extends a long, ungainly tiller; another similar tiller is at the square bow; along the thwarts are two long oars. Just forward of the matting-protected space which I dignify with the name of cabin a mast is stepped. From it hangs a square canvas sail, rigged with bamboo reefs. But by far the most important

part of the wupan's equipment is the ropes of braided strips of bamboo, which are carried in huge coils, some stored on the decks and some below the boards of the cabin.

It is with these ropes more than anything else that we are to be tugged and hauled over sunken reefs, through whirlpools and against a fierce current.

The price of a journey to Chunking in a wupan is an excellent commentary on the rate of wages and the cost of living in China.

The captain or *Lowban* with whom I made the contract has agreed to reach Chunking within 30 days for the sum of 96 taels (about $55 U. S.). Besides the boat, he provides the crew and their food and allows me to carry a cargo of 1,200 catties (1,600 lbs.) of merchandise to a French trader at Chunking, for which I am to be paid by the consignee 26 taels ($16), thereby reducing the cost of my voyage to about $30 gold.

The crew consists of 18 men. If the lowban were to disperse among them all of the 96 taels he receives from me, he would pay each man for his month's labour taels 5.30 ($3.18 U. S.).

Of course he does not do this. All of the taels 96 are not distributed among the crew. A considerable part are retained by the lowban as his profit, so that it is safe to assume that for performing the hardest kind of manual labour, working 14 hours per day in the burning sun, swimming, towing, and tracking, with only a crowded deck as a sleeping-place, each boatman receives considerably less than $3 gold per month.

It must not be supposed, either, that the boatmen's low wages are the gauge of an exceptionally low intelligence.

The wupan is ungainly and hideous, but by a skilled knowledge of their craft they are able to force it against a tide and through whirlpools where steam navigation has never succeeded. Every mile of the way presents new difficulties and dangers. Rarely are any two obstacles of the same kind. They can be overcome only by the greatest ingenuity and a skilled knowledge of their trade that is the result of a life spent on a Yang-tze boat.

July 30. A wupan has three officers; the Lowban or captain, the *Taikon* or pilot, and the headman of the coolies. The rank and authority of all of the three are about equal. Each is responsible for his share of the work, and no one of the three attempts to exercise any authority over the others. From a beam fastened across the boat amidships the lowban works the tiller. His appearance on the beam is not unlike a bird on a perch. His work would be impossible if he wore shoes, but, like all the rest of the ship's company, the lowban's feet are bare. From long practice they seem to have adapted themselves to the three-inch perch, and they cling around it like birds' claws.

At the bow stands the taikon. He manipulates the long oar and shouts orders to his five subordinates, whose duty it is to raise and lower the sail, to fend off the rocks with long bamboo poles and "*Yolo*," as the Chinese call the peculiar style of sculling which furnishes the principal motor power for the great majority of all the ships of the Empire.

The oars are attached by bamboo ropes to bollards in the wupan's bulwarks. In the yolo movement the oars drag in the water parallel with the sides of the boat. The oars are never lifted out of the water as in rowing, but the boatmen merely take hold of the long handles and, with a movement of the wrist, turn the oars in the water and then let them fall back again. The yolo is quite as important a factor in steering as the rudder. By the yolo the boat can be made to go either fast or slow,

and yet the movement of the boatmen in working the oars is always apparently the same. Crude and clumsy as the oars are, it must be a very delicate manipulation of them which can produce such differences of speed and direction without any perceptible difference of method.

The thirteen trackers comprise the shore force of the wupan. The trackers wear over their shoulders a heavy cloth loop, which is attached to the towing rope.

In places when an adverse current is the only obstacle they walk along the shore two abreast, with the rope between them.

When the walls of the gorges rise in precipitous cliffs they clamber from one foothold to another, carrying the tow-line a distance of two hundred yards or more from the boat, make it fast to a tree or to a projecting rock, and then slowly haul the wupan up to them. Here it is made secure by a short line carried ahead again by the trackers. Occasionally we pass a small bay of the Yang-tze or the mouth of a tributary river. To carry the line around such an obstacle would be impossible. At the first bay we encountered I wondered how the feat was to be accomplished. One of the trackers took the end of the rope in his teeth and swam across the inlet. The rest followed him, swimming as unconcernedly as if they were walking on land. Without a moment's hesitation for a drying or resting process, the crowd seized the rope they had just landed and hauled us up to them. This swimming manœuvre is repeated many times in the course of the day. The trackers think nothing of jumping into the river on a minute's notice and remaining for three-quarters of an hour submerged to the shoulders. The whirlpools and undertow make swimming exceedingly dangerous for foreigners, but the boatmen seem to have absolutely no fear. On the rare occasions when the smooth water is reached the trackers clamber into the boat and join the crew at the yolo. One of their number is a boy about twelve years old. It is his especial province to "give the song" to the boatmen. In a childish treble he sings over and over again "O, Yo, Lo Lo La Lo," while the men at the oars keep up an accompaniment of "Ha Che, Ha Che," as they twist at the Yo Lo.

A few of the trackers wear breechclouts. The rest are stark naked. In deference to the scruples of foreigners, the ship's company in Ichang wore the usual blue cotton blouses and trousers; but we had not been under way an hour before every man carefully rolled up his clothes in a neat bundle, hid it away underneath the boards of the deck, and then went back to primitive costume.

July 31. My passport from Pekin easily obtained for me as escort to Chunking a "Red Boat" (*Hong Chuan*). This is one of the lifeboats which from time immemorial the provincial governments of Hupeh and Sichuen have maintained on the Yang-tze River for the safety of boatmen and travellers. The Red Boat derives its name from its crimson colour. In shape it is a flat-bottomed punt about twelve feet long, with square bow and stern. It is equipped with a short mast and sail. The Red Boat's crew of six men are all trained swimmers. They wear a uniform similar to that of Chinese soldiers, but they carry no weapons. The ordinary work of a Red Boat is to patrol the river and to render assistance to junks that may have capsized or have run on a rock, but a mandarin travelling on the river is usually furnished with a Red Boat as an escort to insure the safety of the voyage. As my passport entitles me to the same privileges as a mandarin, the *Jentai* of Ichang readily assented to allow a Red Boat to accompany me all the way to Chunking.

Aug. 1. We experienced to-day an example of the dangers of junk navigation on the upper Yang-tze. From daybreak until noon the trackers had toiled and tugged at the lines, had swum across rivers, and finally succeeded in forcing the wupan through four miles of rapids and whirlpools. We were to halt for traffic in a tiny

harbour, where we could see several junks had already tied up before us. The trackers on shore were making one final effort to drag us around a promontory into the harbour.

The taikon at the bow swung the oar against the last rapid; but he had miscalculated the force of the water. A whirlpool caught the wupan and threw her bow around. The rope snapped like a piece of thread, throwing the trackers on their backs. The current swept our creaking old craft broadside on down the stream. We bumped on rocks and swung round and round like a top. For a moment the lowban lost his head and jumped from his perch; then, recovering himself, he shouted, "Yo La Lo La Yo La la lo," and the others began to work. Little by little the crew edged the wupan in to the shore, and just as I had decided that we were about to capsize we drew up at the bank and made fast to a rock in almost the same spot whence we had started in the morning. The trackers came down to us in the Red Boat five minutes later.

Aug. 2. During the night I was awakened by a tremendous wind-storm, which blew down the gorge. On arising I found that the water had risen five feet during the night. The rise has been so great that the towing-paths along the banks are submerged and impossible for the trackers. There is nothing for it but to wait here until the river falls again, whlch will probably be within thirty-six hours.

Aug. 3. Miao Ko and its environs constitute one of the most beautiful places I have seen in China. Opposite to the town brown cliffs rise sheer and steep out of the river. From a hill just outside of Miao Ko one can obtain a fine view of the gorge, which we shall enter as soon as the water permits. The cliffs at the gorge entrance are almost met by a mountainous promontory. Between the two the brown, muddy water boils like a cauldron. Cliffs and promontory must both be at least 500 feet high. For China, there is an exceptionally large number of trees near Miao Ko and a great abundance of foliage. The green leaves and boughs relieve the monotony of the rocky cliffs. The village itself is on a steep hillside, the houses built in terraces, protected by walls of rough stone. Rude stone stairways lead down to the water's edge. Back of the town is a bamboo grove, where the close leaves keep out the rays of the midsummer sun and form a delightful resting-place. A pretty cascade falls over the rocks near Miao Ko. I at first supposed that its water must be pure, but a short clamber among the rocks soon disillusioned me. Just above the cataract is a rock basin, which the townspeople of Miao Ko use for washing their clothes. All day long men, women, and children beat and roll their soiled trousers and blouses in the clear mountain stream, making the cataract below more polluted than the Yang-tze itself. The obtaining of pure drinking water is one of the difficulties of this part of the world. The rule followed by natives and foreigners alike in treating Yang-tze water is to first clarify it with alum and then boil it for two hours before drinking it; but even after this process it is full of tiny floating particles, which make it look anything but attractive. In a corner of my cabin I have devised a filter out of a fruit can and powdered charcoal, which works admirably. At least so far as appearances go, the water that drips from it is absolutely pure.

The river rose three feet again last night. When we shall be able to go on I do not know.

Aug. 4. The river has risen so high and rapidly during the last few days that it must have reached its maximum. Miao Ko is so charming a place that were it not for my eagerness to lose no time in reaching Ta Chien Lo, I should not in the least object to remaining here a month. About the village are many delightful walks in the shape of rude rock stairways cut in the mountain side. These paths invariably

lead to little shrines, in which sit enthroned gaily-painted idols, to whom the villagers burn sticks of incense.

Living on the Yang-tze possesses one advantage which previous travellers have left untold. The village of Miao Ko is the most economical place in which I have ever resided, as the following prices of commodities will indicate:

Eggs—84 cash per dozen = 5 cents U. S.
One spring chicken = 9 cents U. S.
4 lbs. string beans = 2½ cents U. S.

Fish is plentiful, and I yesterday purchased six pounds of one newly caught that greatly resembled an American pike for 200 cash (about 12 cents U. S.).

Almost every farmer on the hillside hereabouts keeps from four to five goats. They are all snow-white, and are very tame.

Aug. 5. At noon to-day a breeze from the east sprang up, which the lowban at once took advantage of for another start. During the morning the water had fallen some six feet, uncovering the tracking-paths along the bank. A breeze is necessary to steady the boat and to hold her against the current in the crossings which must be made.

The process of crossing the river is the most dangerous part of travel on the Yang-tze, although at first sight it seems like a very simple operation. With the water at its highest, as at present, a number of submerged reefs lurk just below the surface. If the wupan happens to strike one of these, the current catching her on the other side will instantly capsize her, and your wupan will be a total wreck within a few minutes.

A rapid here called the Tong Nin is about three miles long. Between precipitous cliffs and steep, rocky hill sides the current boils and swirls. Several of the rocks are so steep that the tow-lines have to be carried past them. For the purpose we engaged a small *Sanpan*, which preceded us by several boat-lengths.

The way in which a Red Boat can take one of these rapids is simply marvellous. It seems to be taken for granted that a Red Boat can go anywhere on the river.

The crew are under a drill, and know by instinct just what to do in every possible emergency. Although the Red Boat is provided with ropes, the crew seldom use them.

In passing a rapid one man jumps ashore. He carries a long, light bamboo pole with an iron hook at the end. Another man in the boat holds out to him a corresponding pole with a similar hook at the end. The two link them together, thus forming a continuous line, by which the boat is towed.

August 7. For the past two days we have been slowly tugging up the shore. Our progress is about ten miles a day. In the afternoon we are assisted by a light wind, which begins to blow up the river about one o'clock. Strangely enough, in the morning the breeze is always down stream.

This has been the hardest day yet. We passed to-day the *Chi Tan*, perhaps the most dangerous of all the rapids between Ichang and Chunking. At low water this rapid is a mass of projecting rocks; but these are now covered to a considerable depth, and I found the Chi Tan the easiest part of our day's progress.

The weather is frightfully hot. The mercury in the thermometer in my cabin has registered 90° for the last forty-eight hours.

August 10. Days on the Yang-tze are so much alike that a record of one is a record of all.

For about every four rapids which we attempt to pass the wupan is carried away in one, and drifts helplessly down stream. The trackers slowly wander down stream, and start with a new rope from a point half a mile below the rapid.

August 11. The colour of the Yang-tze is a dark brown. Its width varies from half a mile in the more compressed parts of the gorges to a mile and a half in the places where the hillsides are less steep. In the centre the current is so much stronger than at the sides that the difference in the speed of the water causes a back current along the banks, and this pressure of the slow water against the more rapid current causes the centre of the river to rise to a very noticeable height above the edges. Looking up stream the Yang-tze has much the appearance of a city street—raised in the centre and graduating toward the edges, which correspond to the streets' gutters.

Wherever a point of land projects into the river the fierce current striking against it deflects, and the impact causes a diagonal current to form an angle with the shore. This cross-current is visible for perhaps half a mile from the land. It is the continual warfare between these currents which causes what are usually referred to in descriptions of the Yang-tze as "rapids"; but they are not rapids as we understand the term in America. They are not a confusion of waters caused by a current passing over an indiscriminate mass of rocks. The Chinese call these meetings of the currents *Huns*, and regard them as the river's greatest dangers.

In some places the contour of the shore causes the current to parallel it and not to form a cross-current. Such a rapid is called a *Tan*.

Two anchor ropes are considered necessary for a hun, but only one for a tan.

Aug. 12. At nine o'clock this morning we entered the Kuifu gorge. It is only three miles long, but it contains so many huns and tans and the tracking-paths are so high above the bed of the river that it was seven o'clock in the evening before we reached the end of the three miles and tied up at the city of Kuifu.

Along the north bank of Kuifu gorge a road about ten feet in width is cut like a shelf in the side of the cliffs. In some places the road is 200 feet above the river. The outer edge of the roadway is not protected by a rail, and nearly all of the distance one misstep would hurl one into the river, many feet below. The tendency to walk over the edge is to some extent corrected by ingeniously inclining the roadbed inward, so that if the wayfarer's foot slipped he would naturally fall against the cliff and not into the Yang-tze. I walked along this road for almost its entire distance. In one of the highest and most dangerous places I came upon a little village of about a dozen houses. These were built of mud, with the cliff constituting one side of the house. According to Chinese standards, the village was complete in every detail. It contained a tea-house, a spring of water, and several pigs, whose sties were formed by hollows cut out of the rock. As is the rule everywhere in China, children were numerous in the village. They played about the rocks and rolled on the precipice, with, apparently, no fear of ever going over the edge.

Along this road the trackers had to carry the long line that towed the wupan far below them. The line was like a bar of iron, and many times as their backs bent under the strain and they were dragged a foot or so nearer to the edge I expected to see them go tumbling down the face of the cliff. This, my lowban tells me, not infrequently happens. If a heavy boat carries away in the current the only hope for the trackers is to cut the rope and let the boat take care of itself. An instant's lingering on the road means almost certain death for the trackers.

Between Kuifu and Chunking the river broadens, and the *Tans*, though still numerous, are not very dangerous.

Kuifu is the residence of a French Roman Catholic and an English Protestant Missionary. Though these two are the only white men within 200 miles, they dislike each other cordially, and their converts dwell in anything but Christian love.

The Englishman is a graduate of Cambridge, and a man of excellent family. He came to see me, and during my six hours in Kuifu I called on him. I found him in a wretched inn, where he had two scantily-furnished rooms; yet he told me that during a visit to America two years ago he had dined at the White House at the invitation of President Roosevelt.

The Sichuenese are of so dark a brown that they hardly seem to belong to the Mongolian race. They certainly are not yellow Chinese. They are short, thick-set, and muscular, and their features seem to be a strange blending of Ethiopian, Malay, and Mongol. Their skins are of the same colour as the natives of Singapore. They have the almond-shaped eyes of the Chinese; while their noses are as flat and their lips as thick as those of an American negro. This may be due to a touch of Lolo blood. The Lolos, who now survive in mountains near Kiating, were the aborigines of southwest China. They are said to bear a remarkable resemblance to negroes. This is only my first impression of the Sichuanese. I shall probably change it many times as I see more of them.

Shi Liang, the newly-appointed Viceroy of Sichuen, whom I met in Peking, is now on his way to Chentu, his new capital. He will come up the Yang-tze as far as Wantien, and thence go overland to Chentu. Great preparations for his arrival are making all along the river. All day we have accompanied a flotilla of junks, which are escorting two mandarins from Kuifu to Wantien, where they are to superintend the ceremonies of welcoming Shi Liang. Every village shows signs of unusual preparation. The smallest have triangular crimson flags at the landing-places.

Aug. 16. We passed to-day the town of Wantien, one of the largest on the Yang-tze. There seems to be a remarkable similarity in the location of all the towns on this part of the river. They are nearly all on the north bank at the western end of the gorge.

The river has fallen so rapidly during the last few days that it has reached a condition which the Chinese call "half water." In nearly all of the larger rocks on the shore are indentations and holes that have been made by the iron points of the poles by which boatmen have fended in their voyages up and down the river. In corners of the rocks holes have been drilled for receiving junk anchor ropes. Without exception, these holes are notched on the down-river side. The notch is just large enough to contain a bamboo anchor rope. The notches are the result of ages of anchor ropes at each hole. The rocks are all of granite formation.

Once in a while we reach a hun, where the odds are so much against us that the combined strength of fourteen men at the ropes is not sufficient to pull us through. At such places, in accordance with a time-honoured custom, the lowban goes ashore and at the nearest farmhouse asks for assistance. He returns with from twelve to twenty men, women and children from neighbouring fields, who fall in behind the trackers and pull and shout until the hun is passed. The rules of the river compel farmers to give aid to any junkmaster who may ask for it. If the junkmaster can afford it he gives each of his conscript assistants a fee of 5 cash (3 mills U. S. money), but they are compelled by law to work and pull equally hard whether the cash be forthcoming or not.

Aug. 21. For the last three days we have made but little progress. The heat has been intense, and the nights are as hot as the days. The mercury remains stationary at 94° in my cabin. With the heat we have experienced a succession of rainstorms, which do not cool the atmosphere, but only add to the humidity. It is impossible for coolies to track in the rain, because the water makes the rocks and mud banks too slippery for a foothold in walking. At the first appearance of a shower we tie up at

the nearest rock or at a stake driven into the bank. The mats are spread on the frame over the deck, and under it the men huddle.

Aug. (26). The last six days have been uneventful. This part of the Yang-tze resembles a vast lake in appearance.

At six o'clock yesterday afternoon we emerged from a gorge to see a sanpan coming to meet us. From the stern of the sanpan floated a yellow Custom House flag, and an Englishman in a white suit sat in the stern. He told me that Chunking was only eight miles away. After his countersigning of the lowban's papers we continued on our way for a mile, where we made fast for the night.

This morning we reached the wharf of the Chunking Trading Co., where the lowban was paid off and the crew dismissed, but not until each one of them had come forward and saluted me by clasping his hands in front of him. I am assured in Chunking that our voyage of 29 days was exceedingly quick for this time of year. Fifty days is the time usually considered necessary at high water. I am staying at the *Hong* of the *C. T. Co.* I expect to start on my overland journey across Sichuen within ten days.

PEH SHIH I. SICHUEN.

Sept. 7. I begin this morning the second stage of my journey to Ta-Chien-Lo. My company of coolies constitutes a caravan.

Two servants are a necessity. A chair between them means three carriers. My own chair has four carriers, and the luggage needs four more, besides a foreman or director of the entire company, called a "Footoo." In addition to these, I have four soldiers detailed as a guard to accompany me by the Fu Mandarin of Chunking.

The system of engaging a caravan in Sichuen proves that an Express Company in North America is not an innovation after all. On precisely the same principle is a Forwarding Hong of Chunking, where companies of this kind have existed for thousands of years. A Forwarding Hong will transport anybody or anything from one part of Sichuen to another for an agreed sum within a stipulated time, and will guarantee his or its safe delivery. The Hong is responsible for everything it carries, and is bound to refund to the shipper any loss of his merchandise in transit.

In this way I am being shipped. The consigner is the Chunking Trading Co. The consignee is a Chinese trader in Tibetan musk at Ta Chien Lo.

The time limit for the Hong is 28 days. I pay at the rate of 10,000 cash ($6.30 U. S.) for each carrier. All my men find their own food and lodging along the way.

My original plan was to purchase a pony in Chunking; but I found that ponies were outside of the Hong equipments, and that a pony would require a hostler or "*Mafu*" to care for him. The mafu would be responsible to no one. He could steal the pony or steal any of my belongings, and I should have no redress save an unsatisfactory appeal to a mandarin.

For this reason I was compelled to abandon a pony for a chair, not unlike those in vogue in Europe two hundred years ago.

My quartet of soldiers wear red coats edged with black braid, and blue cotton trousers that reach only to their knees. They are minus hats and shoes. Across the back of each is slung a sort of scabbard containing an umbrella and a short broadsword. These two weapons constitute the entire equipment of most Sichuen soldiers, of whom I saw many hundred in Chunking.

To-day we accomplished 90 li (about 30 miles). I am writing this in a Chinese inn which we reached after sundown.

MA FENG CHIAO.

Sept. 8. The so-called road which we are following westward from Chunking is a stone-paved path or walk, about ten feet wide, that winds around and across hills among the rice fields.. The hills are not of any great height, and a road of ordinary width could easily be constructed over them. The reason for the narrow path I take to be a desire to economize every foot of space for the cultivation of rice. Such a dense and crowded agriculture as covers these hills I have never seen before; not even in China. From base to summit every square inch of hillside is terraced in such a way as to form a series of dams encircling the hill. Behind these dams is caught the water of the brooks and rivulets in their course toward the Yang-tze.

These streams also bring with them a considerable deposit of mud and loam, in which they bury the rice sprouts and immerse them in about two feet of water, converting the terraces behind the dams into veritable swamps. It is along the tops of these dams that the stone pathway is built. All day we seemed to be passing through miles of a series of marshes.

The water in the pools is quite stagnant, and in consequence swarms of mosquitoes follow the traveller. Yet these same stagnant rice pools add greatly to the beauty of the scenery. When looked at from above their green scum is not visible. They shimmer in the sunlight like tiny lakes.

The system of Kung Kwans which I found so comfortable in Shensi is sadly modified in this part of Sichuen. The Kung Kwan exists in every town as in the north of China. One suite of rooms is retained for officials or travellers with Government passports, but the rest of the building is rented as an inn for the general public. I am writing this to-night from such a place. Mosquitoes are thick and the thermometer registers 90°.

FUNG SHAN-ZAN.

Sept. 9. Another day amid the rice fields gave me an opportunity to see something of the methods of preparing rice for market.

A crop is now being harvested. After the rice has been mowed with sickles it is tied in bundles and left to dry in the sun. Then a wooden box about six feet long, six wide, and four deep is built near the road by the side of the field. Around three sides of the box a screen of matting about eight feet high is constructed. Two men take the rice in bunches and beat the dry ears against the edge of the box. The rice flies against the screen and falls into the box. By this simple process the immense rice crop of the entire Province of Sichuen is harvested.

I also visited a rice mill where the hulls are removed. The rice, as it comes from the threshing apparatus, is placed in a hole in a hard clay floor. A heavy hammer that just fits the hole is worked by a treadle so as to fall upon the pile of rice beneath. The hole is so dug that the hammer does not fall directly upon the rice and crush it. The rice is struck a slanting blow, which only loosens the husk. It is next placed between two stones, which grind it gently (without pressing it) until the husk falls off, when the rice and chaff are separated by sieves, and the product is ready for market.

Oh, the mosquitoes of Sichuen! In the courtyard of this Kung Kwan are four swinging lamps. They were made in China, but the oil they burn came from the United States. It is for sale in almost every village in Sichuen—in hundreds of places where no other foreign product is known.

YUEN CHUAN.

September 10. The country over which we are now passing is the most prosperous part of China I have ever seen. The costly merchandise for sale in the shops of the towns, the large number of middle-class men who can afford to ride in chairs, and

the excellent maintenance of the temples and shrines would all seem to prove that the Sichuenese are right when they say that their province is the "Garden of China."

In the course of each day's journey the traveller passes at least six towns of considerable size. The arrangement and construction of them all are about the same. The stone walk which constitutes the highway expands at a gateway into a road about twenty feet wide. This expanded road is the main street of the town. Crossing it at right angles are other streets, all paved with huge stone blocks, which—for China—are kept quite clean. Opening on the streets are many shops, whose variety and quality of merchandise are unequalled in China.

The shops of Peking do not compare with those of Sichuen. Silks, furs, silver, jewellery, confectioners and tailors' shops, are at every corner, along with warehouses for rice and grain. Dealers in grain sit in front of their offices at little tables, on which samples of the different grades of their commodity are exposed in neat piles to public view, much as grain samples are arranged in the New York Produce Exchange.

The "science of business" seems to have reached a degree of perfection, or imperfection, that would do credit to any metropolis in the world. In exchanging my silver *syce* into *cash* for travelling expenses I encounter a slight fluctuation in price from day to day. This is due to a "market for money," which exists in every town.

The market is a counterpart of a Bourse or Board of Trade in the West. Here the Chinese merchants meet every morning, and, by bidding on exchange for the various parts of the country, establish a rate for the next twenty-four hours. Gold is always quoted in the Yang-tze Valley in Shanghai taels.

Because of the high water in the river very little merchandise from Shanghai reaches Sichuen during the summer, so that the balance of trade is strongly against Shanghai—a fact which is sad for a traveller from a land on a gold basis. But Shanghai exchange is falling now with the river. Its fractional reduction is determined from day to day by these "markets for money."

The number of inhabitants of Sichuen is variously estimated at from 40,000,000 to 65,000,000. Its area is about 215,000 square miles.

Broadway during the "rush" hours was never so crowded as is any street of a Sichuen town. The crowds push and jostle so vigorously that it takes a deal of shouting on the part of my bearers to open a way for us.

The same numerous population is found in the fields. Human beings literally swarm everywhere, even in the rice swamps, where hundreds can be seen at the threshing-boxes or ploughing in the mud with water-buffaloes.

LUNG CHUAN.

Sept. 11. The fervour for and interest in the Buddhist religion are noticeable in an increased degree as we approach nearer to the Tibetan border. As far as Chunking the usual blending of the three faiths of China—Buddhist, Taoist, and Confucian—was to be seen in all the temples, Taoist good-luck sticks before Buddhist images and tablets to Confucius confronting pictures of Gautama in the same temple yard. But now the manifestations of Confucius and the Taoists are growing fewer with each day's march.

In the roadside shrines and temples we see images that illustrate the life of Gautama and the Bodisats. Some of the images are remarkably well executed, and the excellent condition in which they are maintained shows the reverence in which they are held.

Buddhist priests are everywhere. I find them on the roads, in the inns, and in

the shops of the towns; their close-shaven heads, with the marks of their initiation burned in the scalp, are in marked distinction to the queues of the ordinary Chinaman. In several towns which we passed to-day a sort of screen had been constructed at the side of the street. On the screen was painted a design of Buddhas around a picture of Gautama in the centre. In front of the screen was seated a priest reading prayers in chanting monotone. He kept time with his sing-song melody by beating with a stick on a hollow gourd. His attitude was of rapt attention as he went through the ceremony. He was contemplating Gautama, and was drowning the distracting noises of the town by the drum-beats.

LI O SUNG.

Sept. 12. At Lung Chuan the road to the westward divides, uniting again two-days' journey farther on. The stone pathway has now dwindled to less than five feet in width. It is with the utmost difficulty that one chair can pass another. No one but trained Chinese bearers could acccomplish the feat at all. In passing, the bearers of the two chairs step to the edge of the path and swing their burdens out over the rice swamps below them, moving forward at the same time. One misstep would mean a bath in about four feet of mud.

By the roadside, hereabouts, are stone structures of the same shape as pagodas. They are all about twenty feet high. They are hollow, and near the base of each is a large opening. Within the structure, just underneath the opening, is an iron grate and evident preparation for kindling fires.

Upon inquiring what these structures might be, I was informed that they were furnaces for burning waste-paper on which were any written or printed characters.

CHANG CHAU SHAN.

Sept. 14. Tze Liu, where I passed last night, is the centre of the salt-mining industry of China. As the traveller approaches Tze Liu from any direction he sees outlined against the sky a multitude of derricks, each about seventy feet high, of the same shape and design as stone-hoisting derricks at home. Each derrick marks a salt well.

A merchant of Tze Liu, who had been apprised of my coming, called on me at the inn in Tze Liu, and said he would be pleased to act as my guide in visiting the salt wells. I gladly accepted his invitation, and returned with my admiration of Chinese ingenuity greatly increased. The system of mining salt proves that the Chinese have had for centuries a knowledge of mechanics which far excelled the mechanical knowledge of Europe 300 years ago.

With the one great difference, that steam-power is not used in salt-mining, the system and apparatus are quite as complex as similar operations in the United States.

The salt is held in a solution of black brine that is found at a depth of from 150 to 1,500 feet. The brine strata are reached by a drive-well, exactly like a petroleum-boring, with the difference that bamboo trunks about six inches in diameter take the place of iron pipe.

Inside the bamboo tube a bucket is lowered into the brine. The bucket, too, is made of sections of bamboo welded together with wrought iron. This bucket is fitted at the bottom with a heavy leather washer, which is opened by the force with which it strikes the brine-water and is closed again when it begins to ascend. This bucket is raised and lowered by a heavy rope made of *Zoudza* (a kind of bamboo). The rope is passed over a wheel in the top of the derrick above the well, and thence by a system of pulleys to a bamboo drum about twenty feet in diameter.

This drum is made to revolve by water-buffaloes harnessed to arms that project from it. The buffaloes are worked in relays.

The brine is emptied from the bamboo bucket into a stone tank, from which it runs through a series of bamboo tubes to the evaporating-house. Lines of these tubes, on trestles, extend for miles around Tze Liu. They form a pipe-line system that existed a thousand years before the Standard Oil Co. was born. The brine-tubes all concentrate in the big square stone building, where the salt is evaporated. The brine is run into iron pans built over brick furnaces. Under each pan natural gas is burning. This fuel was discovered near Tze Liu about sixty years ago, and since that time has been used for all the drying processes.

Bamboo, again, takes the place of iron pipe in bringing the gas from the underground well about half a mile away. As it leaves the bamboo the gas flows through a trough filled with sand. This sand is ignited, and forms the burner for the pans. Between the rows of pans are natural-gas torches to increase the heat of the room. These consist of bamboo tubes about ten feet in height, the ends covered with a baked clay cap, through which the gas percolates slowly enough to burn with a subdued flame.

Although salt wells abound everywhere within a radius of thirty miles of Tze Liu, the natural-gas output is only at one place, on the eastern edge of the town. The distance between the gas and some of the outlying wells is too great for the conveying of the brine through the bamboo pipe-line. From the more distant wells the brine is brought down the Shuen Tan River in large sanpans, built on the principle of an oil-tank steamer. The sanpans are emptied into the pipe-line by an endless-chain apparatus, which works on the principle of a grain-conveyer. The motive power consists of coolies, who sit on a bench on the bank and, with their feet, whirl around the axle on which the conveyer-chain revolves.

Short as is the period during which natural gas has been used as the salt-dryer of China, it has been used in Sichuen for twice as many years as in America. In Tze Liu there is no anxiety as to the diminution of the supply. The flow is as great to-day as when it was first discovered.

TSIA CHAU PU.

Sept. 15. Shortly before noon to-day we passed the town of Yung tien, one of the largest between Chunking and Kiating. On the side of a rocky hill near Yung tien is a head of Buddha cut in a stone alcove. The head must be fifty feet in height, and is remarkably well executed. The head is gilded, and very beautiful as the sunlight falls on it across the hillside.

SÜ LIO PU.

Sept. 16. I am writing to-night from a farm-house about 95 li (29 miles) from Kiating.

Soon after leaving Tsia Chau Pu this morning we encountered a heavy rainstorm which followed us all day. The road was in wretched condition, and very slippery for the coolies. It has been my custom in rough places to leave my chair and walk. I was attempting this to-day, when my foot slipped on a stone, and I stumbled down an embankment, my knee striking a rock and causing considerable pain. My boy helped me back into my chair, and we came on to this little hamlet, where we were compelled to stop for the night.

My knee is stiff and swollen and rather painful. Fortunately we are only one stage from Kiating, where there is a medical missionary.

KIATING.

Sept. 17. We reached here this evening at 7.30, after the hardest day's march since leaving Chunking. The fine drizzle of yesterday continued during the morning, making rapid progress over the slippery road impossible.

My lame knee kept me in my chair all day.

The size of the farm-houses and their barns and outhouses is evidence of the prosperity of Sichuen. Were it not for the ever-present rice fields and water-buffaloes it would take but little stretch of the imagination to fancy oneself in America.

Many of the farm-houses are built of stone or brick. Some of them are two stories in height. In front of almost every house is a sort of yard, containing an arbor built of bamboo, over which vines are trained. Near some of the houses, too, are beds of flowers.

The approach to Kiating from the east is a delightful relief after the monotony of rice fields and hillside terraces. The narrow stone road gradually descends into the valley of the Min River. The road passes between high sandstone cliffs overhung with moss and ferns and crosses several small streams on heavy stone bridges. After 9 li (3 miles) of this kind of a highway we suddenly emerged on the bank of the Min. Across it, about a mile and a half away, I could distinguish in the gathering twilight the pagodas and temple roofs of Kiating. My luggage, two boys, coolies, and myself were loaded into a sanpan and yoloed across to the small river gate of the city.

GANG JOU PU.

Sept. 18. Kiating is the cleanest city I have seen in China. The pavements of the streets are not only built of stone blocks, but they are kept in excellent repair, and graduate from a raised centre to gutters at the side like an American roadway. Some streets, too, have stone curbs that border narrow stone sidewalks the like of which are rare in the Eighteen Provinces.

I visited the Canadian Methodist Mission station, where I found a medical missionary named Dr. Adams. He looked at my knee and told me that I had fractured the knee-cap.

It was so swollen, however, that he could not make a very thorough examination. He referred me for a more definite diagnosis to an American Baptist missionary at Yachau, five days' journey from Kiating. With some bandages which Dr. Adams gave me and a piece of board I improvised a splint, which my boy Ming Yi tied around my leg, so as to prevent any bending of the knee. I have had the foot-rest of my chair swung at an angle, to obviate the necessity of taking my knee from a rigid position while riding, and by these devices I manage to be very comfortable.

HUNG YA.

Sept. 19. The country through which we have passed since leaving Kiating is one of the most beautiful regions I have ever seen anywhere.

The road to Yachau from Kiating is a direct course of 90 miles to the northwest. The road follows the valley of the Ya River, from which the Yachau derives its name. The Ya flows into the Tung river about ten miles west of Kiating.

The current of the Ya is very swift, and at this season of the year the river has so many rapids that navigation in ordinary junks or wupans is impossible.

The only craft that can be used in the Ya current are rafts. These are made of the trunks of bamboo trees lashed together and turned up at one end into a curved bow, so that a Ya raft looks for all the world like a large American toboggan.

Along the banks of the Ya winds the road we are following. Intead of rice, grain is raised in this part of Sichuen. It is harvest-time now, and the vast population are at

work in the fields. The grain is cut with sickles and threshed with flails. The mills in which it is ground into flour are ingenious contrivances.

In the shallows of the Ya River a mill race is constructed by piling two rows of cobblestones about twenty feet apart. The current forced between the two stone dams is made to turn a mill wheel whose axis passes through the centre of a round stone platform about twenty feet in diameter. Just inside the edge of the platform is a groove about eighteen inches wide and a foot deep, extending around the entire circumference of the platform. Into this groove the grain is poured. From the top of the mill-wheel axle extends an arm, which forms the axle of a large round stone weighing 400 or 500 lbs. This stone fits into the groove, and as the mill wheel revolves the stone swings around the platform, crushing the grain as it passes over it.

I looked in vain to-day for a foot of ground that was not under cultivation. Everywhere fields of grain. There is no timber in our sense of the word, but around almost all of the numerous temples is a grove of bamboos. Ferns and moss abound on all the rocks. The road crosses the smaller streams on stone bridges that are all very old and show a great knowledge of engineering. The larger bridges are built on the principle of the cantilever. In the ascent of hills the road takes the form of a stairway whose steps are blocks of hewn sandstone about four feet long by eighteen inches square. Between Chunking and Tibet there are no vehicles on wheels, and beyond Kiating we have met no beasts of burden but men, although I am told that pony and donkey caravans do occasionally make the journey to Yachau. There is no noise of traffic in the road. One hears only the sound of flails and the voices of men, women, and children gathering the harvest.

Pagodas are noticeably absent from the landscape. The few that are to be found on the higher hills are of great age and very much out of repair.

Buddhist temples and shrines, on the other hand, are kept in excellent repair. The images are, without exception, newly painted, and in every temple priests are to be seen drumming out their prayers on hollow gourds. Near the roadside to-day I saw two women kneeling before a shrine which contained a gaily-painted idol. They had built a little fence of incense sticks around themselves, and within this they had prostrated themselves on their faces.

They were carrying on an earnest conversation with the idol, and frequently kowtowed to it.

SUI KO.

Sept. 21. We left Hung Ya this morning in a pouring rain. For about 20 li the road followed the right bank of the Ya to a little wharf near a farm-house. Here we found a sanpan, which conveyed us to the opposite bank.

Immediately on landing the coolies put down their burdens, took long breaths, and rested for ten minutes. Then at the word "Zo" (go) from the No. 1 they shouldered their chairs and baskets and began the ascent of a hill that rose abruptly from the water's edge. In order to ascend, the road, which was no wider than a path, wound in a sharp zigzag up the face of the hill. The angle of inclination was more than 30° during the entire ascent.

The coolies could not stop for so much as a minute after the ascent was begun. Their tendency was constantly to slip backward. In rounding one of the many corners of the road the bearers would make pivots of their shoulders and pass the chair and its occupant out over the cliff side, which ran sharp and steep down to the water's edge. As I looked down from my chair while being passed through space I could not but feel that one misstep of my bearers would mean for me a fall of several hundred feet like a log of wood.

But the ascent of the hill gave me my first view of the Tibetan mountains. As we neared the summit of the hill I could make out far to the northwest a range of high peaks dimmed by the distance and the clouds that circled about them. Below lay the Ya winding in and out between hillsides and white gravel beds.

In the distance rafts dotted the silver water, and caravans of men, like my own, seemed no larger than flies as I looked down on them after that dangerous ascent.

The country is wilder than any I have found thus far. The inn from which this is written is only an annex to a farm-house in a hamlet of a dozen houses.

The road for several hours this afternoon led through bamboo groves and crossed mountain streams on heavy stone bridges.

Ya Chau.

Sept. 22. We reached this town at two o'clock this afternoon. Ya Chau is surrounded on the northeast and west by high mountains. They are devoid of verdure, and their beauty is sadly marred by the terraces which cover their sides. Ya Chau itself is a dreary, dirty town, whose streets wander aimlessly in all directions. It is, however, quite a commercial centre as the head of navigation on the Ya River.

The only foreigners in Ya Chau are Americans. They are both Baptist missionaries. One, named Openshaw, is a Staten Island man, and the other, Corlies, is a physician from Philadelphia. They both called on me at the inn. I am the first American they have seen for more than a year.

Dr. Corlies improved the splint on my leg, and decided that I was suffering from nothing more serious than "fractured ligaments." This is very cheering news, although my leg is still painful, and I must not take it out of the splint until I reach Ta Chien Lo. At the doctor's advice I shall spend to-morrow in Ya Chau.

Ya Chau.

Sept. 23. This has been a day of preparation. Everything is being put in readiness for a harder road than any over which I have yet travelled. The coolies who have carried me safely from Chunking have been exchanged here for another lot.

Sept. 24. The map which I am using is the China Inland Mission of Bretchneider's Atlas. It is supposed to indicate all the roads of China, but between Ya Chau and Ta Chien Lo the map is a blank. No road is shown, and only two towns.

As the road has never been described I wish to give some account of it in its entirety. This will be possible only when the eight-days' journey between Ya Chau and Ta Chien Lo is finished.

Ta Chien Lo.

Oct. 2. The road which we have followed from Ya Chau looks, as I have marked it on my map, like a large letter U. Although Ya Chau and Ta Chien Lo are in almost the same latitude, the route between them passes far to the southward, and then, when within a quarter of a degree of the latitude of Kiating, veers to the northwest toward Ta Chien Lo.

The reason for this circuitous course is the mountain ranges, which begin at Ya Chau. Their height varies from 5,000 to 15,000 feet. Between them are passes through which the road winds. Where there is a river valley the road follows it. In a river bottom the road crosses the river again and again. It takes a twist of two or three days' journey around a mountain that could be crossed in half a day.

In some places the road is eight feet wide. In others its width is about six feet, but it often narrows to four feet. Nowhere between Ya Chau and Ta Chien Lo is it

more than a path. Travel over this road is very exciting. For fully half the distance the traveller sees on one side of his chair only the steep side of a mountain whose summit is covered with clouds, and on the other looks down into ravines and gorges into which one misstep of his chair-bearer would hurl him. In ascending a mountain the road makes many sharp turns. When one of these is reached the chair-bearers pass their burden out over the abyss below. To look down at such moments is anything but a pleasant sensation.

The scenery is monotonously grand. Day after day one sees nothing but mountains, black and steep and gloomy. In many of the valleys there is little sunlight.

Ya Chau is 1,400 feet above sea-level and Ta Chien Lo nearly 9,000 feet. So that the nine-days' journey between the two places means a climb of more than 7,000 feet. This sudden change from the humid climate of the Yang-tze Valley to the rarefied atmosphere sometimes causes a rush of blood to the head and attacks of fainting. I fortunately escaped serious trouble. Fearful and dangerous as the road is, it is one of the commercial highways of China. It is preliminary to the caravan route to Tibet, which begins at Ta Chien Lo. The amount of merchandise carried over it would seem almost incredible when its difficulties are considered. It is exceptional to pass over one li of the way without meeting at least six or eight men to whose backs are strapped tightly-bound packages. Occasionally in some defile one hears the tinkle of the leader of an approaching train of donkeys, laden, like the men, with every kind of merchandise.

Although the land is bleak and desolate and cold, several of the towns which mark the end of the caravan's stages are of considerable size and importance. In the bottom lands and on the sheltered sides of the mountains are farms and farmhouses, although these are not nearly so numerous as in the country east of Ya Chau.

In my nine-days' journey I passed two Shen towns, Yung Lan and Tsing Ki. The former is a dreary, dirty place, but contains a population estimated at 8,000. For twelve hours after leaving Yung Lan we were ascending a mountain called the Shan Nin, at whose base flows a tributary of the Ya River, forming the Ban Feng Valley.

The eastern slopes of Shan Nin are covered with underbrush and dense verdure, which extends clear to the summit, but, on the western slopes, a few straggling blades of coarse grass are the only form of vegetation that relieves the bare black rocks of the mountain side. This sudden change from verdure to barrenness is explained by the fact that the eastern side of Shan-Nin is protected from the wind, which strikes against the western side of the mountain.

To the westward, from the little plateau on the top of Shan-Nin, was a range of blue mountains, whose summits were covered with snow. In the centre towered one higher than the rest. It was of great length, and seemed to be flat on the top, and half way to the summit hung a fringe of white clouds. This, my coolies informed me, was Bea Chu Sü, one of the sacred mountains of Tibet. Above the clouds, they said, is a temple of Buddha.

At the base of Shan-Nin is the Shen town of Tsin Ki. For China Tsin Ki is very clean. It has large shops, and shows signs of great commercial prosperity. The Mandarin of Tsin Ki called on me at my Kung Kwan, and we spent a very pleasant evening. He was the jolliest person I had met since Shanghai. His first question was to ask how old I was, and he told me that he was fifty-one. He was a little weazened man with small, bright eyes. He told me that in times past he had disliked foreigners, but that he now realized that foreigners were bound to make their way into China, and he had decided to do all he could to make it pleasant for them. The Mandarin did not seem able to distinguish foreigners from missionaries.

Two days after leaving Tsin Ki we entered the valley of the Tung River. This is one of the very few rivers of China which are not navigable for any kind of craft. For a few hundred li to the westward of Kiating, where it empties into the Min, rafts and sanpans are able to float down stream; but the upper Tung, which we followed, although broad and deep, is almost one continuous rapid for hundreds of miles. The road runs along its left bank to Luting, where the river is crossed by a suspension bridge hung from iron chains. Chain bridges are the kind most frequently met with after leaving Ya Chau. To one unaccustomed to them they appear frail, but some of them, I was told, have withstood the continual travel of hundreds of years.

Luting is a caravan town of about 2,000 inhabitants. It is at the base of a mountain 21,000 feet high. On and around it we toiled as far as Wa-sze, where we turned sharp to the westward. Between Wa-sze and Ta Chien Lo we passed through a country different from any I have ever seen in the Chinese Empire. There were no towns, and scarcely any villages, only clusters of four or five houses, which marked the beginning and end of each day's journey. The land is not under cultivation, and almost the only signs of human habitation are occasional flocks of long-haired goats and yaks grazing on the mountain side.

For the greater part of the way the road from Wa-sze follows a wild gorge, through which runs a torrent, tributary of the Tung. It was on this part of the road that I first became aware of the fact that I was approaching the western confines of the Eighteen Provinces. The colloquial language of the inns suddenly changed from Chinese to Tibetan. I met a number of Tibetans in the narrow road. Their appearance and costume were very different from the Chinese.

Their hair was long and straight, and their complexion more brown than yellow—not unlike that of the Hindu. They all wore scarlet mantles made of a kind of burlap, with scarlet trousers and turbans of the same material. Their boots were like Indian moccasins, but they reached as high as their knees, and were decorated with stripes of green and yellow leather.

Two days after leaving Wa-sze I saw in a hollow of the mountains a cluster of tiled roofs. This was Ta Chien Lo, where I am now writing, and here I expect to remain six months. I am staying at the station of the China Inland Mission.

I have taken two rooms in a Tibetan inn, and I have engaged a Buddhist Lama to teach me the Tibetan language. He has recently come from Lhassa, where he lived for twelve years.

FRANCIS H. NICHOLS.

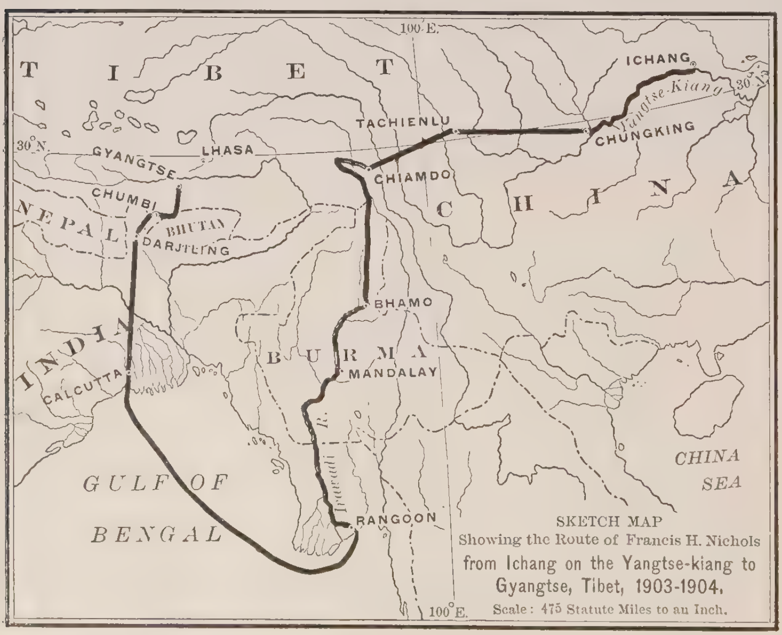
PLACES AND DISTANCES, FROM CHUNG KING TO TACHIENLU.

(From the Diary of F. H. Nichols)

Chung King	to	Fou tou kwang	15	Li
Fou tou kwang	"	Lou Chao pu	15	"
Lou Chao pu	"	Lung dong kwan	25	"
Lung dong kwan	"	Peh Shih I	5	"
Peh Shih I	"	Tsu Ma Kong	20	"
Tsu Ma Kong	"	Lao Kwang Kow	15	"
Lao Kwang Kow	"	Lai feng I	15	"
Lai feng I	"	Ting Chia Ya	20	"
Ting Chia Ya	"	Ma feng Chiao	20	"
Ma feng Chiao	"	Ta Kan Chan	20	"
Ta Kan Chan	"	Yan Chuan Hsien	30	"
Yan Chuan Hsien	"	Huang Kho Su	30	"
Huang Kho Su	"	Yue ting pu	30	"
Yue ting pu	"	Feng Kou pu	30	"
Feng Kou pu	"	Yun Chuan Hsien	30	"
Yun Chuan Hsien	"	Mou tze Chiao	20	"
Mou tze Chiao	"	Shou Chue fang	30	"
Shou Chue fang	"	Li shih Chuen	25	"
Li shih Chuen	"	Shih Yen Chiao	15	"
Shih Yen Chiao	"	Lung Chang Hsien	20	"

Lung Chang Hsien	to	Tse Chia Chan	15	Li
Tse Chia Chan	"	Lung shih Chuen	15	"
Lung shih Chuen	"	Wang Chia Chan	25	"
Wang Chia Chan	"	Lung Ling pou	15	"
Lung Ling pou	"	You fu doe	15	"
You fu doe	"	King Chia Lan	15	"
King Chia Lan	"	Shing Ling pu	15	"
Shing Ling pu	"	Shuan tang	25	"
Shuan tang	"	Kan tze An	20	"
Kan tze An	"	Tze Lin Chien	15	"
Tze Lin Chien	"	Cheng Chia Chan	55	"
Cheng Chia Chan	"	Chang Chia Chang	25	"
Chang Chia Chang	"	Kou san pu	20	"
Kou san pu	"	Yun Hsien	20	"
Yun Hsien	"	Tsia Chan pu	25	"
Tsia Chan pu	"	Lao Quean Tai	15	"
Lao Quean Tai	"	Chan tan Chiao	15	"
Chan tan Chiao	"	Tsu Yuen pu	30	"
Tsu Yuen pu	"	San Kiang Chun	30	"
San Kiang Chun	"	Ma Tae Chien	10	"
Ma Tae Chien	"	Ho Ee Kan	25	"
Ho Ee Kan	"	Ma Lao San	35	"
Ma Lao San	"	Be tze Kai	10	"
Be tze Kai	"	Kia ting fu		—
Kia ting fu	"	Cha Chung	70	"
Cha Chung	"	Hung Wa	70	"
Hung Wa	"	Sui Ko	75	"
Sui Ko	"	Yachau	45	"
Yachau	"	Yung Lan	85	"
Yung Lan	"	Tsin Ki	105	"
Tsin Ki	"	Dei En Go*	50	"
Dei En Go	"	Ming Ko	60	"
Ming Ko	"	Nin Shi	70	"
Nin Shi	"	Sa Wan	75	"
Sa Wan	"	Wa Sze	30	"
Wa Sze	"	Ta Chien Lo	60	"
			1715	Li
		One li = .3 of a mile.	.3	
			514.5	miles.

* Luting is 25 li north of Dei En Go.



SKETCH MAP
Showing the Route of Francis H. Nichols
from Ichang on the Yangtse-kiang to Gyangtse, Tibet, 1903-1904.
Scale: 475 Statute Miles to an Inch.

CHARTER OF INCORPORATION.

GRANTED APRIL 13, 1854.

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

SECTION 1. George Bancroft, Henry Grinnell, Francis L. Hawks, John C. Zimmerman, Archibald Russell, Joshua Leavitt, William C. H. Waddell, Ridley Watts, S. De Witt Bloodgood, M. Dudley Bean, Hiram Barney, Alexander J. Cotheal, Luther B. Wyman, John Jay, J. Calvin Smith, Henry V. Poor, Cambridge Livingston, Edmund Blunt, Alexander W. Bradford, and their associates, who are now or may become hereafter associated for the purposes of this act, are hereby constituted a body corporate by the name of "The American Geographical and Statistical Society," for the purpose of collecting and diffusing geographical and statistical information.

§ 2. For the purposes aforesaid, the said Society shall possess the general powers and privileges, and be subject to the general liabilities, contained in the third title of the eighteenth chapter of the first part of the Revised Statutes, so far as the same may be applicable, and may not have been modified or repealed; but the real and personal estate which the said Society shall be authorized to take, hold, and convey, over and above its library, and maps, charts, instruments, and collections, shall not at any time exceed an amount the clear yearly income of which shall be ten thousand dollars.

§ 3. The officers of said Society shall be a president, three vice-presidents, a corresponding secretary, a recording secretary, a librarian, and a treasurer, and such other officers as may from time to time be provided for by the by-laws of the said Society.

§ 4. The said Society, for fixing the terms of admission of its members, for the government of the same, for changing and altering the officers above named, and for the general regulation and management of its transactions and affairs, shall have power to form a code of by-laws, not inconsistent with the laws of this State, or of the United States, which code, when formed and adopted at a regu-

lar meeting, shall, until modified or rescinded, be equally binding as this act upon the said Society, its officers, and its members.

§ 5. The Legislature may, at any time, alter or repeal this act.

§ 6. This act to take effect immediately.

STATE OF NEW YORK, *Secretary's Office.* } *ss.:*

I have compared the preceding with the original law on file in this office, and hereby certify the same to be a correct transcript therefrom, and of the whole of said original law.

[L. S.] Given under my hand and seal of office, at the city of Albany, this thirteenth day of April, one thousand eight hundred and fifty-four.

A. G. JOHNSON,
Deputy Secretary of State.

AMENDED CHARTER.

PASSED APRIL 8, 1871.

STATE OF NEW YORK, NO. 237, IN SENATE. *March* 7, 1871.—Introduced with unanimous consent, by Mr. Bradley; read twice, and referred to the Committee on Literature; reported favorably from said committee, and committed to the Committee of the Whole.

CHAP. 373.

AN ACT in relation to The American Geographical and Statistical Society.

PASSED April 8, 1871.

The People of the State of New York represented in Senate and Assembly, do enact as follows:

SECTION 1. The name or corporate title of the said Society shall hereafter be The American Geographical Society of New York.

§ 2. The object of the said Society shall be the advancement of geographical science; the collection, classification and scientific arrangement of statistics, and their results; the encouragement of explorations for the more thorough knowledge of all parts of the North American continent, and of other parts of the world which may be imperfectly known; the collection and diffusion of geographical, statistical and scientific knowledge, by lectures, printed publications, or other means; the keeping up of a correspondence with scientific and learned societies in every part of the world, for the collection and diffusion of information, and the interchange of books, charts, maps, public reports, documents, and valuable publications; the permanent establishment in the city of New York of an institution in which shall be collected, classified, and arranged, geographical and scientific works, voyages and travels, maps, charts, globes, instruments, documents, manuscripts, prints, engravings, or whatever else may be useful or necessary for supplying full, accurate, and reliable information in respect to every part of the globe, or explanatory of its geography, physical and descriptive; and its geological history, giving its climatology, its productions, animal, vegetable, and mineral; its exploration, navigation, and commerce;

having especial reference to that kind of information which should be collected, preserved, and be at all times accessible for public uses in a great maritime and commercial city.

§ 3. The power given by the act hereby accorded to the said Society, to take, hold, convey, manage, and make use of its real and personal estate, shall be understood as authorizing said Society to take and hold by gift, grant, bequest, devise, subject to all provisions of law relative to devises and bequests by last will and testament, or purchase real estate to the value of three hundred thousand dollars, and to invest its income, or its personal estate generally, so as to produce a regular annual income sufficient for the accomplishment of the purposes set forth in the first section of this act; but said annual income shall not exceed twenty-five thousand dollars annually.

§ 4. The said Society shall make an annual report of its proceedings to the Legislature.

STATE OF NEW YORK, } *ss.*:
Office of Secretary of State. }

I have compared the preceding with the original law on file in this office, and do hereby certify that the same is a correct transcript therefrom, and of the whole of said original law.

[L.S.] Given under my hand and seal of office, at the city of Albany, this twenty-second day of May, in the year one thousand eight hundred and seventy-one.

DIEDRICH WILLERS, JR.,
Deputy Secretary of State.

LAWS OF NEW YORK.

CHAP. 650.

AN ACT allowing the American Geographical Society of New York to take and hold a larger amount of real and personal property than under previous acts relating to that Society.

BECAME a law May 13, 1895, with the approval of the Governor. Passed by a two-thirds vote.

The People of the State of New York, represented in Senate and Assembly, do enact as follows:

SECTION 1. The American Geographical Society of New York may hereafter take and hold by gift, grant, purchase, devise or bequest, subject, except in the matter of income, to all provisions of law relative to devises and bequests by last will and testament,

real and personal property to the amount of one million dollars, and any income therefrom accruing, for the uses, purposes and objects of the said society.

§ 2. This act shall take effect immediately.

STATE OF NEW YORK, }
Office of the Secretary of State. } *ss.:*

I have compared the preceding with the original law on file in this office, and do hereby certify that the same is a correct transcript therefrom and of the whole of said original law.

JOHN PALMER,
Secretary of State.

BY-LAWS

OF THE

American Geographical Society.

As Amended October 23, 1897.

The following By-Laws are hereby established as the rules and ordinances of the American Geographical Society, and all other By-Laws, Rules and Regulations heretofore made are hereby repealed.

CHAPTER I.

MEMBERSHIP.

1. The Society shall consist of Fellows and of Honorary and Corresponding Members.

2. Honorary Members shall be chosen on account of their distinction in the science of geography, or of statistics, and not more than three of them shall be elected in any one year.

3. Corresponding Members shall be chosen from those who communicate valuable information to the Society and who have promoted the knowledge of geography, or of statistics.

4. Fellows, Honorary Members and Corresponding Members shall be elected by the Society as follows: All nominations of candidates shall be made in writing at a meeting of the Council by a member thereof. The names of persons thus nominated, if approved by the Council, shall be recommended to the Society for election at its next stated meeting.

5. The name of any Fellow or Member of the Society may, on the recommendation of the Council and by vote of a majority of the members present at a stated meeting of the Society, be dropped from the list; and the name of any Corresponding Member may be dropped from the list by vote of the Council, without reference to the Society.

CHAPTER II.

INITIATION FEE AND ANNUAL DUES.

1. Each Fellow of the Society shall, immediately on election, pay an initiation fee of ten dollars, which shall be considered to include his annual dues for the current year.

2. The annual dues of each Fellow thereafter shall be ten dollars, payable in advance on the 1st of January.

3. Any Fellow of the Society, not in arrears, may commute for life all dues, by the payment at one time of one hundred dollars.

4. The name of any Fellow of the Society who has neglected for two successive years to pay the annual dues, or who at any time refuses to pay them, may, by the Council, be dropped from the list.

5. The fiscal year of the Society shall be the calendar year commencing January 1, and ending December 31.

6. Honorary and Corresponding Members shall be exempt from payment of initiation fee and annual dues.

CHAPTER III.

OFFICERS.

1. The officers of the Society shall be a president, three vice-presidents, a foreign corresponding secretary, a domestic corresponding secretary, a recording secretary, a treasurer and fifteen councillors; and these together shall form the Council of the Society.

2. All the officers above-named shall be elected by the Society at its annual meeting.

3. No one shall be voted for, for any office, unless he has been nominated by the Council, or unless his nomination, made in writing by at least nine Fellows of the Society, has been conspicuously posted in the office of the Society for ten days prior to the date of the Annual Election.

4. The president and treasurer shall each be elected for one year and until their successors have been elected; and at each annual meeting there shall be elected one vice-president, one secretary, and five members of the Council, each for the term of three years and until their successors have been elected.

5. All officers to be elected may be voted for on one ballot.

6. Any Fellow of the Society, who has been such for twenty days and who is not in arrears for dues, shall be entitled to vote at the annual election.

CHAPTER IV.

ANNUAL MEETING.

1. The annual meeting of the Society shall be held on the second Monday in January, or on any other day which may be designated by the Council for the purpose.

2. At the annual meeting the Council shall present a report of the proceedings of the Society during the past year, and the treasurer shall present his annual report.

CHAPTER V.

MONTHLY AND SPECIAL MEETINGS.

1. The Society, unless it is at any time specially ordered otherwise by the Council, shall hold a stated meeting for the transaction of business on the second Monday of each month except July, August, September and October.

2. The president, or, in his absence or incapacity, one of the vice-presidents, may, and upon the written request of the Council or of twenty-five members of the Society shall, call a special meeting of the Society by giving three days' notice thereof in two daily newspapers published in the city of New York.

CHAPTER VI.

ORDER OF BUSINESS.

1. At stated meetings of the Society the order of proceedings shall be:

    Reading of the minutes.
    Reports and communications from officers of the Society.
    Communications from the Council.
    Reports from committees.
    Election of members.
    Miscellaneous business.
    Papers and Addresses.

2. All propositions presented to the Society at any meeting, for action, shall be in writing. A proposition thus presented, when seconded, shall be deemed to be in possession of the Society and open for discussion, but may be withdrawn by the mover at any time before amendment or decision.

3. No member shall speak more than five minutes, nor more than once, upon the same question, until all other members present have had an opportunity to be heard, nor more than twice on any question, unless leave is specially granted by the Society.

CHAPTER VII.

QUORUM.

1. At meetings of the Society nine members present shall constitute a quorum.

CHAPTER VIII.

COMMITTEES.

1. Each committee authorized by the Society shall consist of three members, who shall, unless otherwise ordered, be appointed by the chairman.

CHAPTER IX.

PRESIDING OFFICER.

1. At all meetings of the Society, on the arrival of the appointed hour and the presence of a quorum, the president, or, in his absence, one of the vice-presidents, or, in the absence of all of these officers, a Fellow of the Society shall take the chair and call the meeting to order.

2. The chairman shall have only a casting vote. He shall preserve order and decide all questions of order, subject to an appeal to the Society. At every annual meeting, before the opening of the polls, he shall appoint two tellers of the election. In case of a contest, he may declare the election postponed to the next meeting, in order that a corrected poll list may be prepared by the secretary and verified by the Council; but only one such postponement shall be made.

CHAPTER X.

SECRETARIES.

1. It shall be the duty of the Foreign Corresponding Secretary to conduct the correspondence of the Society with individuals and associate bodies in foreign countries.

2. It shall be the duty of the Domestic Corresponding Secretary to conduct the correspondence of the Society with individuals and associate bodies in the United States.

3. In case of vacancy in the office of either of the corresponding secretaries, or in the absence or disability of either of these officers, the duties of either may be performed by the other secretary, or by the librarian.

4. The secretaries shall keep in books at the rooms of the Society copies of all letters written by them, and shall file at the said rooms all letters received by them on behalf of the Society.

5. At each stated meeting of the Council they shall respectively report their correspondence, and read the same or such parts thereof as may be required.

6. The Council may designate a particular officer, or appoint a

committee, to prepare a letter or conduct a correspondence on any special subject.

7. It shall be the duty of the Recording Secretary to give due notice of all meetings of the Society and to attend the same. He shall keep adequate minutes of the proceedings of the Society. He shall give immediate notice to officers and committees of all votes, orders, resolves, and proceedings affecting them or pertaining to their respective duties. He shall at each annual election hand to the tellers a list of the members of the Society entitled to vote. He shall have charge of the seal of the Society and of the charter, by-laws, records and general archives, except so far as they may be placed by the Council in charge of others. He shall sign and affix the seal of the Society to all diplomas, deeds or other documents authorized by the Society or Council.

8. All documents in charge of the secretaries shall be kept at the rooms of the Society, unless otherwise specially ordered by the Council.

CHAPTER XI.

TREASURER.

1. The Treasurer shall have charge of all deeds, contracts, bonds, certificates, securities and muniments of title belonging to the Society. He shall collect all dues to the Society and keep the funds safely deposited in some incorporated bank or trust company approved by the Council.

2. Funds so deposited shall be drawn out only by check of the Treasurer, countersigned by the chairman of the Council, or by such other officer as may be designated by the Council for that purpose.

3. The Treasurer shall, prior to the annual meeting of the Society, prepare and submit to the Council for audit a detailed account of his receipts and disbursements during the past year, which account, duly audited and approved, he shall present to the Society at the annual meeting.

CHAPTER XII.

COUNCIL.

1. The Council shall have the management and control of the affairs, property, library, and funds of the Society, and shall transact all such business of the Society as is not required to be transacted by the Society at a stated meeting. It shall designate a bank or trust company in the city of New York in which the funds shall be

deposited by the treasurer. It shall have charge of and edit all the publications of the Society.

2. It may adopt rules for its own government, not inconsistent with the charter and by-laws of the Society; and appoint such standing and special committees as it may deem proper, and define their duties. It shall appoint the librarians, clerks and other servants of the Society, and fix the powers, duties, privileges and compensation of each. But no appointment shall be made which shall not be revokable at the pleasure of the Council.

3. It shall have power to fill for the unexpired term any vacancy that may occur in its own body or in any of the offices of the Society, and it may declare a vacancy to exist in any office whenever the incumbent thereof is, by reason of absence or otherwise, incapable of performing its duties. It shall have power to declare vacant the seat of any member of its own body (except the president and vice-presidents) who shall have been absent from its meetings for three successive months.

4. The Council may for good cause remit the annual dues of any Fellow of the Society.

5. No member of the Council shall, directly or indirectly, receive any salary or pecuniary compensation for his services to the Society.

CHAPTER XIII.

ALTERATION OF BY-LAWS.

No alteration in these by-laws shall be made, unless proposed in writing at a stated meeting of the Society and referred to the Council for consideration, and approved by the Council and adopted by the Society at a subsequent meeting.

HONORARY AND CORRESPONDING MEMBERS AND FELLOWS.

HONORARY MEMBERS.

HARMSWORTH, Alfred Charles, London.
McCLINTOCK, Admiral Sir F. L., R.N., K.C.B.
MARKHAM, Sir Clements R., K.C.B., President of the Royal Geographical Society.
MENDENHALL, Thomas C., Ph.D.
MURRAY, Sir John, K.C.B., Edinburgh.
NANSEN, Dr. Fridtjof, Christiania.
NARES, Vice-Admiral Sir George S., R.N., K.C.B.
PEARY, Commander Robert E., U.S.N.

CORRESPONDING MEMBERS.

ABBE, Prof. Cleveland, Washington.
BONAPARTE, Prince Roland, Paris.
BREWER, Prof. Wm. H., New Haven.
BROWNLEE, J. Harrison, C. E., Seattle, Wash.
CHAILLÉ-LONG, Col. C.
CHAIX, Prof. Emile, Geneva, Switzerland.
CORA, Guido, Rome.
DAVIDSON, Prof. George, San Francisco.
GANNETT, Henry, Washington.
GARDNER, Prof. James T., Albany.
GILLIODTS VAN SEVEREN, L., LL.D., Bruges.
GILMAN, Daniel C., LL.D., Baltimore, Md.
GOBAT, Dr. A., Nat. Councillor, Berne.
GRIGORIEV, Alex. V., Sec'y Imp. Russian Geographical Society, St. Petersburg.
HUNT, William H., Tamatave, Madagascar.
JACKSON, Frederick George, London.
LAPPARENT, Prof. A. de, Paris.
LECLERCQ, Jules, Brussels.
LUCE, Rear-Admiral S. B., U.S.N.
LUMHOLTZ, Carl, M.A., New York.
NEY, Count Napoléon, Paris.
PEET, Rev. S. D., Chicago, Ill.
PERALTA, Manuel M. de, Paris.
PROUT, Henry G.
PUMPELLY, Prof. Raphael.
SEMENOV, Peter P., Vice-Prest. Imp. Russ. Geog. Soc., St. Petersburg.
TACHÉ, E. E., Asst. Commissioner of Crown Lands, Quebec.
VIGNAUD, Henry, Paris.
VINCENT, Frank, New York.
VON DEN STEINEN, Prof. Dr. Karl, Berlin.
WILLIAMS, Horace E., São Paulo, Brazil.
WYSE, Lieut.-Com. Lucien N. B., Paris.

FELLOWS.

JUNE 30, 1905.

Names of Life Fellows are printed in italics.

Date of Election.

1889 *Abbot, Edwin H.*
1902 Acheson, Edward G.
1902 Ackerman, Ernest R.
1904 Adae, C. F.
1892 Adams, Cyrus C.
1903 *Adams, Edward D.*
1899 Adams, Robert Franklin.
1891 Agar, John G.
1904 Agens, Frederick G.
1885 Agnew, Andrew G.
1886 Alden, R. Percy.
1898 *Aldrich, Mrs. James Herman.*
1898 Alexander, Harry, E.E., M.E.
1888 Alexander, J. F.
1901 Allen, James Lane.
1898 Allen, W. F.
1903 Allen, William Porter.
1898 *Allin, F. Brevoort.*
1904 Amend, Robert F.
1883 Ames, Adelbert.
1903 Amundson, John A.
1890 *Anderson, Arthur A.*
1897 Anderson, A. J. C.
1901 Anderson, R. Napier.
1890 Andreini, J. M.
1887 Andrews, Wm. L.
1898 Appleton, Herbert.
1903 *Appleton, Nathan.*
1887 *Archbold, John D.*
1904 Archer, George A.
1904 Arend, Francis J.
1891 Arms, George.
1898 Armstrong, Charles P.
1891 Armstrong, Collin.
1899 Arnold, Benjamin Walworth.
1895 Arnot, M. H.
1890 Astor, John J.
1874 *Astor, William W.*
1905 Atkinson, James Jesse.
1891 Atkinson, John B.
1883 *Atterbury, J. T.*

Date of Election.

1903 Atwater, James C.
1899 Atwood, Kimball C.
1904 Avery, Stephen.
1899 *Aycrigg, B. Arthur.*
1897 Ayer, James C., M.D.

1874 *Backus, Henry C.*
1886 Backus, J. Bayard.
1903 Bacon, Daniel.
1904 Bacon, Francis H.
1882 *Bacon, Francis M.*
1897 Bacon, Selden.
1897 *Bailey, Miss Alletta Nathalie.*
1904 Bailey, Edward G.
1904 Bain, Samuel M.
1904 Baker, A. G.
1902 *Baker, B. N.*
1899 Baker, O. M.
1900 *Balch, Edwin S.*
1904 Balch, Glen E.
1881 *Baldwin Edwin.*
1874 *Baldwin, Townsend B.*
1899 Baldwin, William D.
1901 *Ballantine, Robert F.*
1888 *Bancroft, H. H.*
1884 Bangs, Fletcher H.
1868 *Banks, David.*
1887 *Barbey, Henry I.*
1882 *Barger, Samuel F.*
1889 Baring, Thomas.
1890 Barnard, John F.
1901 Barnard, John H.
1898 Barnes, Chas. J.
1874 Barnes, John S.
1904 Barnes, Oliver W.
1905 *Barney, Edgar S.*
1882 Barney, N. C.
1874 Barr, William.
1904 Barringer, Daniel Moreau.
1887 *Barron, John C., M.D.*
1888 Barstow, J. Whitney, M.D.

Date of Election.
1878 *Barton, Oliver Grant.*
1899 *Bartow, Charles S.*
1905 Bastin, J. E.
1898 Batchelor, Charles.
1895 Beal, William R.
1904 Beaman, George Herbert.
1904 Beaman, Mrs. Charles C.
1901 Beckley, John N.
1886 Beddall, Edward F.
1875 Beekman, Gerard.
1888 Beers, M. H.
1874 Belding, Milo M., Sr.
1897 Belding, Milo M., Jr.
1891 Belin, Henry, Jr.
1901 Belknap, Henry.
1900 Bell, Alexander Graham.
1900 *Bell, Bertrand F.*
1897 Bell, Dr. Ralcy H.
1883 Bell, Capt. William R.
1904 Bellows, Horace M., M.D.
1890 Benedict, James H.
1905 Bengston, N. A.
1897 Benjamin, Morris W.
1903 *Bennett, Frederick W., C.E.*
1868 Bennett, James Gordon.
1883 Benson, Frank Sherman.
1890 Bergen, James C.
1891 Bernheim, Gustav.
1903 *Bernheimer, Charles L.*
1890 Bertschmann, J.
1886 Berwind, Edward J.
1891 Besly, Chas. Howard.
1875 Beste, Henry.
1869 Bickmore, Prof. A. S.
1897 Biddle, Anthony J. Drexel.
1889 Biddle, Edward R.
1895 Bien, Joseph R.
1874 Bien, Julius.
1903 Bigelow, Frank G.
1904 Bigelow, Henry B.
1889 *Bigelow, Poultney.*
1887 *Biglow, Lucius H.*
1903 Binney, Harold.
1893 Birdsall, Mrs. W. R.
1904 Blackmore, Henry Spencer.
1905 Blaine, William T.
1898 Blake, Theodore A.
1878 *Bliss, Cornelius N.*
1890 *Bliss, D. L.*
1901 Bliss, William H.

Date of Election.
1895 Boas, Emil L.
1888 Bogert, S. G.
1891 Bogue, Virgil G.
1886 Bond, Frank S.
1905 Bonilla, Luis Enrique.
1884 *Bonner, G. T.*
1904 Bonsal, Stephen.
1904 *Bookman, Samuel, Ph.D.*
1874 Bookstaver, Henry W.
1899 Booraem, John V. V.
1859 *Boorman, J. Marcus.*
1900 Bormay, W. J.
1903 Bourne, Charles Griswold.
1886 Bouvier, M. C.
1902 *Bowditch, Charles P.*
1904 Bowditch, Ernest W.
1900 *Bowdoin, George S.*
1904 *Bowdoin, Temple.*
1886 Bowers John M.
1883 *Bowne, Walter.*
1890 *Brackenridge, George W.*
1904 Bradford, Sidney.
1904 *Bradley, Arthur C.*
1895 Bradley, Edson.
1904 Bragaw, E. T.
1897 *Brainard, Lt.-Col. David L., U.S.A.*
1904 Braman, Dwight.
1899 Brett, George P.
1890 Brewster, C. O.
1904 Brewster, George S.
1902 *Brewster, Robert S.*
1886 Bridgman, E. C.
1900 Bridgman, Herbert L.
1903 Brizse, Charles N.
1889 *Bromberg, Frederick G.*
1890 Brooker, Chas. F.
1904 Brooks, Alfred H.
1886 *Brown, Addison.*
1904 Brown, Rev. Clement.
1903 Brown, F. Q.
1878 Brown, J. Romaine.
1878 Brown, Rev. Philip A. H.
1887 *Brown, Robert I.*
1904 *Brown, William L.*
1899 Browne, Aldis B.
1875 Brownell, Silas B.
1874 *Brownson, Rear Adm. W. H., U.S.N.*
1901 *Bruce, Miss Matilda W.*

Date of Election.
1901 *Bruce-Brown, William.*
1904 Bruggerhof, F. W.
1901 Bruguière, Louis Sather.
1902 *Buchanan, James Isaac.*
1900 Bulkley, Justus L.
1903 *Bunker, George R.*
1897 Burdge, Franklin.
1902 *Burrage, Albert C.*
1902 *Burrage, Albert C., Jr.*
1902 *Burrage, Francis H.*
1902 *Burrage, Russell.*
1903 Burton, Prof. A. E.
1899 Busby, Leonard J.
1890 Bushnell, Joseph.
1902 Butes, Alfred.
1895 Butler, Joseph G., Jr.
1905 Butler, M. J., LL.B., C.E.

1901 Cabell, Walter Coles.
1903 Caesar, Henry A.
1897 Cameron, W. L.
1888 Canda, Charles J.
1887 Cannon, H. W.
1884 Carey, Henry T.
1904 *Carnegie, Andrew.*
1901 *Carnegie, George L.*
1904 Carnegie, Thomas M.
1905 Carpenter, Franklin R., Ph.D.
1886 *Carter, Henry C.*
1889 *Carter, John J.*
1897 Cassard, William J.
1899 Chace, George A.
1897 Chamberlain, Rev. John.
1897 Chamberlain, Rev. Leander.
1899 Chambers, Arthur D.
1897 Chambers, Frank R.
1899 Chambers, Frederick F.
1904 Chancellor, William E.
1890 Chanler, William Astor.
1905 Channing, J. Parke.
1897 *Chapin, Chester W.*
1901 Chapin, E. P.
1883 *Chapman, Henry E.*
1868 Chapman, Joseph H.
1888 Chase, George.
1904 Chatfield-Taylor, H. C.
1886 *Chauncey, Elihu.*
1899 Chisholm, Hugh J.
1888 Chisolm, George E.
1902 *Church, Duane H.*

Date of Election.
1874 *Church, Col. George Earl.*
1897 Church, George H.
1884 *Claflin, John.*
1891 Clapp, George H.
1887 Clark, Jefferson.
1901 Clark, W. A.
1886 Clarke, C. C.
1882 *Clarkson, Banyer.*
1889 Clausen, George C.
1904 Cleland, Frank Benedict.
1883 Clews, Henry.
1883 Clyde, William P.
1905 Coan, Dr. Titus Munson.
1905 Cobb, Sanford E.
1890 Cockcroft, Miss Mary T.
1897 Coffin, C. A.
1886 Coffin, Edmund.
1891 Cogswell, W. B.
1891 Cohen, Samuel M.
1900 Cole, Edward H.
1901 Cole, George Watson.
1888 Coleman, James S.
1898 Collier, M. Dwight.
1886 *Colvin, Verplanck.*
1897 Combe, Mrs. William.
1892 Comer, John H.
1897 *Comstock, Frederick H.*
1889 Comstock, George Carlton.
1899 Condon, Thomas G.
1886 Conger, Clarence R.
1884 *Connor, W. E.*
1874 *Conyngham, William L.*
1898 Cook, Eugene B.
1894 Cook, Dr. Frederick A.
1888 Cook, Henry H.
1893 Coolidge, J. Randolph.
1903 Cornell, Russell R.
1902 Corning, C. R.
1897 Corning, G. M.
1886 Corthell, Elmer L.
1902 Cotton, Louis K.
1888 *Coutan, Charles Albert.*
1905 Coutant, Dr. Richard B.
1898 Cox, A. Beekman.
1899 *Cox, John Lyman.*
1902 *Coxe, Eckley B., Jr.*
1901 *Crain, Dunham Jones.*
1902 Cramp, Charles H.
1904 Crane, Albert.
1889 *Crane, Charles R.*

Date of Election.
1902 *Crane, Zenas.*
1887 *Cranitch, William I. A.*
1900 Crawford, C. G.
1905 Crile, George, M.D.
1888 Crimmins, John D.
1899 Crimmins, T. E.
1874 Crocker, George A.
1874 Crosby, J. Schuyler.
1901 *Crozier, Capt. William.*
1903 Cuntz, J. H.
1901 Curran, James.
1901 *Curtis, William Edmond.*

1884 Dalley, Henry.
1871 Daly, Joseph F.
1905 Dana, Richard T.
1901 Dana, Samuel B.
1903 Dana, William B.
1895 Daniels, Charles H.
1892 Daniels, W. L.
1898 Davidson, James W.
1875 Davies, Julien T.
1884 Davis, Howland.
1877 *Davis, Joseph Beale.*
1901 Dawson, Miles Menander.
1905 Day, William S.
1905 Dean, Mrs. Bashford.
1880 *Deane, John H.*
1892 DeBuys, A.
1883 Decker, Joseph S.
1901 de Coppet, Henry.
1880 *Deen, William M.*
1895 De Kalb, Courtenay.
1900 *Delafield, Albert.*
1874 Delafield, M. L.
1903 de Lemos, Theodore W. E.
1890 Dellinger, Charles F.
1901 Dennis, Rev. James S.
1899 Dennis, John B.
1901 Dennis, Samuel S.
1874 *de Peyster, Gen. J. Watts.*
1904 Derr, Andrew F.
1880 *Dexter, Henry.*
1904 *Dey, Anthony.*
1903 Dick, Evans R.
1894 Dieterich, Charles F.
1897 Dillingham, Edwin R.
1905 Dimock, George E.
1890 *Dinsmore, C. Gray.*
1899 Diven, George M.

Date of Election.
1886 Dix, Morgan, D.D.
1904 Dix, Samuel M.
1881 *Docharty, Augustus T.*
1889 Dodd, S. C. T.
1897 Dodge, Rev. D. Stuart.
1903 Dodge, Gen. Grenville M.
1896 Dodge, Richard E.
1901 Dodge, Walter Phelps.
1893 Dodson, Robert Bowman.
1875 Dommerich, L. F.
1889 *Donald, Peter.*
1899 Doremus, Robert P.
1897 Doughty, Mrs. Alla.
1884 *Douglas, James.*
1903 Douglass, R. D.
1904 Doyle, John F.
1888 *Drexel, Mrs. Joseph W.*
1891 Drey, Max.
1880 Du Bois, Frederick N.
1874 *Du Bois, William A.*
1898 Dunham, Edward K., M.D.
1897 Dunnell, William N., D.D.
1905 Dunning, Clement S.
1897 Dunscomb, S. Whitney, Jr.
1889 Du Pont, Col. H. A.
1901 *Durand, John S.*
1889 Durkee, Eugene W.
1894 Duvall, William C.
1889 Dwight, Jonathan, Jr., M.D.

1882 *Earle, Joseph P.*
1886 *Easton, Robert T. B.*
1905 Eaton, Charles Edwin.
1902 Eberstadt, Edward F.
1904 Eccles, Robert G., M.D.
1880 Eckert, Gen. Thomas T.
1905 Eckert, T. T., Jr.
1904 Edwards, Arthur M., M.D.
1882 Edwards, J. Pierrepont.
1887 Egleston, Melville.
1897 Eimer, August.
1901 *Eldert, Cornelius.*
1901 *Eldridge, Lewis A.*
1900 Eldridge, Roswell.
1887 Elkins, S. B.
1879 *Elliott, Samuel.*
1886 Ellis, George W.
1875 Ellis, John W.
1882 *Ellis, Wilbur Dixon.*
1903 Ellis, William H.

Date of Election.
1900 Embury, Aymar.
1882 *Emerson, John W.*
1904 Emmons, Arthur B.
1903 Endicott, William C.
1883 Eno, Amos F.
1903 Eskesen, Eckhardt V.
1891 Eustis, W. E. C.
1891 Eyerman, John.

1903 Fahnestock, Gates D.
1882 Fairbanks, Leland.
1890 Fairchild, Chas. S.
1892 Fairchild, Samuel W.
1902 Fairleigh, David W.
1875 Fargo, James C.
1901 *Farnsworth, William.*
1896 Farquhar, Edward Y.
1874 Farragut, Loyall.
1903 Faulkner, Charles J.
1890 *Fearing, Daniel B.*
1898 Fearons, Geo. H.
1898 *Ferguson, Henry.*
1888 *Ferguson, Walton.*
1904 Fessenden, Gen. Francis.
1904 Findley, William L.
1900 Fischer, Emil S.
1901 Fischer-Hansen, Carl.
1904 Fish, Charles Henry.
1902 Fisk, Harvey Edward.
1902 Fisk, Pliny.
1903 Fitzgerald, Frank T.
1886 *Flagler, H. M.*
1889 Flint, Chas. R.
1901 *Flower, Anson R.*
1901 *Flower, Frederick S.*
1875 Folsom, George W.
1875 *Ford, James B.*
1905 Foster, Frederic deP.
1901 Fowler, Jonathan Odell, Jr.
1874 *Fox, Austen G.*
1905 Frankland, Frederick W.
1884 Frazer, Alfred.
1894 Frazer, Horatio N.
1873 Freedman, John J.
1889 Freeland, Theodore H.
1894 Frick, John.
1902 Frissell, A. S.
1904 Fritz, Horace H.
1875 Fuller, Charles D.
1901 Fulton, E. M., Jr.

Date of Election.
1898 Gadd, Luther G.
1904 Gade, William T.
1903 *Gaff, Thomas T.*
1889 *Gage, E. B.*
1905 Gager, C. Stuart.
1905 Gaines, David H.
1886 Gallatin, Frederic.
1904 *Gammell, William.*
1904 Garrett, Robert.
1897 Garver, John A.
1903 *Gates, Isaac E.*
1891 Gay, Edward.
1879 Gay, Joseph E.
1868 *Gebhard, William H.*
1905 Geer, Robert C.
1905 Gennert, Miss Helen L.
1903 Geographical Institute, Uuiversity of Budapest
1903 Gerdau, Otto.
1900 Gerhard, William Paul, C.E.
1868 *Gerry, Elbridge T.*
1889 *Gest, Erasmus.*
1894 Gibbs, John Wilson, M.D.
1874 *Gibbs, Theodore K.*
1903 Gibney, John R.
1901 *Gilbert, Clinton.*
1889 Gilbert, G. K.
1893 *Gilbert, J. H. Grenville.*
1903 Gilman, Theodore P.
1885 Glazier, Simon W.
1897 Gleason, John J.
1904 Glidden, Charles J.
1897 Golding, John Noble.
1905 Goldsborough, John Byron.
1904 *Goodhart, Philip J.*
1898 *Goodnow, Harold P.*
1900 Goodridge, F. G., M.D.
1898 Goodwin, Rev. Francis.
1886 *Goodwin, James J.*
1887 Gossler, Gustav H.
1887 Gould, George J.
1905 Granbery, Julien Hastings.
1899 Grant, F. E.
1905 Grant, Madison.
1904 Graves, George Coe.
1904 Gray, William Travers.
1895 Greeff, Ernest F.
1897 Green, Frederick V.
1901 Green, Pinckney F.
1891 Greene, David M.

Date of Election.
1883 *Greenough, John.*
1856 Greenwood, Isaac J.
1892 Greenwood, Langdon, Jr.
1905 Griswold, Clifford S.
1897 Grossmann, Ignatius R.
1887 *Grosvenor, James B. M.*
1897 Gruber, Abraham.
1903 Guggenheim, Simon.
1904 *Gunther, Bernard G.*
1886 *Gunther, Franklin L.*

1891 Haas, Kalman.
1869 *Hadden, John A.*
1887 Hague, James D.
1874 *Haines, John P.*
1903 Hale, Edward L.
1901 Hall, Rev. Dr. Charles Cuthbert.
1868 Hall, Elial F.
1905 Hall, James P.
1903 Hamilton, Edmond H.
1879 Hamilton, William Gaston.
1904 Hansmann, Carl A.
1888 Harbeck, Charles T.
1888 Hard, Anson W.
1905 Hardenbergh, William P.
1901 Hardie, Wainwright.
1900 Harding, Edward.
1900 Hardley, J. Wheeler.
1902 Hare, J. Knowles.
1903 Harrison, Hugh H.
1897 Hart, Walter T.
1905 Hartzell, J. Culver.
1903 Harvey, Miss Rebecca.
1882 Hascall, Theodore F.
1887 Hastings, Thomas S., D.D.
1904 Haupt, Louis, M.D.
1905 Havemeyer, H. O., Jr.
1859 *Havemeyer, John C.*
1902 *Havemeyer, William F.*
1894 Haven, J. Woodward.
1889 Haynes, Henry W.
1891 Hazard, Frederick R.
1898 *Hearn, Arthur H.*
1897 *Hearn, George A.*
1905 Heath, H. E., E.E.
1883 *Hebert, Henry B.*
1902 Hedge, Frederic H.
1903 Heimann, Julius.
1897 Heinsheimer, L. A.
1902 Henderson, Charles R.

Date of Election.
1886 Henderson, Harold G.
1874 Hendricks, Edmund.
1901 Hentz, Henry.
1899 *Herbert, John W.*
1903 Herrmann, Nathan.
1900 Herzog, F. Benedict, Ph.D.
1904 *Hess, Selmar.*
1904 *Heurich, C.*
1903 *Hewitt, Peter Cooper.*
1905 Hewlett, Mrs. John D.
1900 Hewlett, Walter Jones.
1901 Heydt, Herman A.
1882 *Higginson, James J.*
1894 Hildreth, J. Homer.
1903 Hill, Charles B.
1890 Hill, James J.
1886 Hillhouse, Thomas G.
1904 *Himmelwright, A. L. A.*
1887 Hinchman, Walter.
1881 Hinman, Russell.
1903 *Hirsch, Robert B.*
1904 Hitchcock, E. A.
1904 Hitchcock, Mrs. Roswell D.
1889 *Hitchcock, Welcome G.*
1903 Hobbs, Edward H.
1905 Hobby, C. M., M.D.
1903 Hodgman, George F.
1898 Hodgson, Richard, LL.D.
1904 Hoe, Alfred G.
1886 Hoe, Robert.
1897 Hoe, William A.
1876 Hoes, William M.
1897 Hoey, Rev. Joseph L.
1901 Hoffman, Charles F., Jr.
1872 *Holbrook, Levi.*
1904 Holland, Joseph.
1876 Holt, Henry.
1902 Holton, Henry D.
1904 Holzmaister, Louis V.
1901 *Hopkins, George B.*
1896 Hoppin, Hamilton L.
1897 Hoppin, Samuel Howland.
1904 Horne, Durbin.
1896 Hotchkiss, Miss C. W.
1905 Howard, William Lee, M.D.
1898 Howell, M. D.
1905 Hoxie, William D.
1888 *Hoyt, Henry R.*
1905 Hoyt, Samuel N.
1898 *Hubbard, Robert J.*

Date of Election.
1901 *Hubbard, Thomas H.*
1885 Hubbard, Walter.
1900 Hudnut, Richard A.
1897 Humphreys, Alexander C., M.E.
1893 *Huntington, Archer M.*
1868 *Huntington, Daniel.*
1893 Hurlbut, Theodore D.
1898 Hurley, Thomas J.
1883 *Hurry, Edmund Abdy.*
1889 *Hurtt, Frank D.*
1890 Husted, Seymour L., Jr.
1897 Huyler, John S.
1901 Hyde, Augustus L.
1892 *Hyde, Clarence M.*
1883 Hyde, E. Francis.
1897 Hyde, Dr. Frederick E.
1901 *Hyde, James H.*

1904 Iden, Charles W.
1899 Insull, Samuel.
1899 Ireland, J. de Courcy.
1859 Ireland, John B.
1890 Irving, Walter.
1874 Iselin, Adrian, Jr.
1887 *Isham, Charles.*
1881 *Ives, Brayton.*
1903 Ives, Frederick D.

1903 Jackson, A. Wendell.
1904 Jackson, John B.
1886 *Jackson, Rev. Samuel M.*
1897 Jackson, Theodore F.
1886 Jacobi, Abraham, M.D.
1891 Jaffray, Robert.
1894 James, Arthur Curtiss.
1874 James, D. Willis.
1890 James, Walter B., M.D.
1886 Janeway, Henry L.
1890 Janin, Henry.
1891 Jaques, W. H.
1903 Jarvie, James N.
1905 Jay, John.
1879 Jay, William.
1887 Jenkins, Augustus S.
1893 Jenkins, Michael.
1895 Jennings, Oliver G.
1902 Jessup, Henry W.
1874 *Jesup, Morris K.*
1880 *Jewett, George L.*
1881 Johnson, Bradish.

Date of Election.
1901 Johnson, Edward C.
1893 Johnson, Reverdy.
1905 Johnson, Willis Fletcher, L.H.D.
1905 Jones, Joshua T.
1888 *Jones, Oliver L.*
1871 Jones, Walter R. T.
1885 Juilliard, A. D.
1904 Jungmann, J., M.D.
1901 Julian-James, Mrs. Cassie.
1905 Just, John A.

1898 Kahn, O. H.
1881 *Kane, Grenville.*
1893 *Kane, Henry Brevoort.*
1879 Kane, S. Nicholson.
1904 Kaufmann, Mort J.
1895 *Kean, Hamilton F.*
1874 Keck, Thomas.
1880 *Keene, James R.*
1888 Kellogg, Charles.
1897 Kemmerer, M. S.
1903 Kemp, James Furman.
1873 *Kennan, George.*
1901 Kennedy, E. G.
1901 *Kennedy, George G., M.D.*
1888 Kennedy, H. Van Rensselaer.
1881 *Kennedy, John S.*
1901 Kent, William.
1904 Kenyon, Robert N.
1885 *Keppler, Rudolph.*
1903 Kerr, John B.
1883 Kerr, Walter.
1901 *Ketchum, Alexander P.*
1887 Kevan, William.
1886 *Kidder, Camillus G.*
1904 Kidder, Edward H.
1897 Kimball, Alfred R.
1883 King, D. H., Jr.
1874 King, Edward.
1882 *King, George Gordon.*
1892 King, John Hurtin.
1904 King, W. Nephew.
1874 *Kingsland, William M.*
1901 Kirby, Thomas E.
1881 Kirsch, Louis.
1888 Kissel, Gustav E.
1891 Kissel, Rudolph H.
1905 Klepetko, Frank.
1904 Knapp, Dr. Herman.
1899 Knight, D. Allen.

Date of Election.
1887 *Knight, George T.*
1901 Kohlman, Charles.
1897 Kohn, S. H.
1901 Kohnstamm, Emil V.

1897 Lachman, Samson.
1905 La Fétra, Linnæus Edford, M.D.
1890 Lamberton, Charles L.
1895 Landon, Francis G.
1898 Lane, Wolcott G.
1882 Langdon, Woodbury.
1881 *Langdon, Woodbury G.*
1882 Lapham, Lewis H.
1904 Lathrop, James Roosevelt.
1904 *Laughlin, George M.*
1901 Lawrence, Arthur, D.D.
1897 Lawrence, Cyrus J.
1892 Lawrence, E. A.
1902 Lawrence, John Burling.
1904 Lawrence, W. B.
1903 Lawson, Victor F.
1901 Lawson, William.
1886 Leete, C. H.
1900 Le Gendre, William C.
1900 *Leggett, Francis H.*
1903 Lehmaier, James M.
1905 Lemon, J. S.
1903 Lesher, Arthur L.
1901 *Leupp, William H.*
1902 Leverich, S. Duncan.
1904 Levi, Emil S.
1891 Levine, Julius.
1896 *Lewis, Clarence McK.*
1902 Lewis, Rev. William G. W.
1881 *Libbey, William.*
1903 Lincoln, Lowell.
1898 Lincoln, Solomon.
1902 Linderman, Garrett B.
1905 Lindsey, Edward.
1899 *Lippincott, Henry H.*
1903 Lisman, Frederick J.
1881 *Little, Joseph J.*
1897 *Livingston, Goodhue.*
1903 Lloyd, Henry A.
1897 Lobenstine, William C.
1901 Lockman, Myron A.
1904 Lodge, Henry Cabot.
1900 Loeb, Morris.
1870 *Loew, Frederick W.*
1891 Loewy, Benno.

Date of Election.
1887 Logan, Walter S.
1897 Long, Thomas J.
1903 *Lorillard, Pierre.*
1890 *Loth, Joseph.*
1878 *Loubat, J. F., LL.D.*
1883 Lounsbery, R. P.
1876 *Low, A. Augustus.*
1875 *Low, Seth, LL.D.*
1903 *Low, William G.*
1905 *Lowell, Percival.*
1898 Lowenstein, B.
1886 *Ludington, Charles H.*
1899 Lüttgen, Walther.
1889 Lydig, David.
1900 Lyman, Frank.
1888 *Lynch, James D.*

1900 M'Caleb, Thomas.
1898 McAlan, John.
1903 McConnell, Samuel P.
1895 *McCord, William H.*
1905 McCormick, Robert H., Jr.
1887 McCready, N. L.
1897 McDonald, John E.
1903 McDougall, Walter.
1901 McFarlane, C. T.
1897 McKeen, James.
1888 McKeever, J. Lawrence.
1898 McLean, Donald.
1904 *McMillan, William Northrup.*
1895 McMillin, Emerson.
1905 McQueeney, Francis J., M.D.
1903 McWilliams, Daniel W.
1903 Maas, Gustavus.
1905 Macdonald, Benjamin J.
1905 MacDougell, George R.
1887 Mack, J. W.
1903 *Mackay, Clarence H.*
1883 *Mackay, Donald.*
1884 *MacKellar, William.*
1890 Mackey, Charles W.
1898 MacKie, Charles Paul.
1898 MacKie, James Steuart.
1901 Macy, George H.
1901 *Macy, V. Everit.*
1904 Mager, F. Robert.
1898 Magerhans, Adolph W.
1899 Mahl, William.
1889 *Maitland, Alexander.*
1902 Mandeville, H. C.

Date of Election.

1903 Mann, William D'Alton.
1905 Manning, Charles H., U.S.N.
1874 Marble, Manton.
1897 Marc, Theophilus M.
1904 Marcou, John B.
1875 Marcus, Arnold.
1895 Marcus, George E.
1882 *Markoe, Francis H., M.D.*
1888 *Marquand, Henry.*
1898 Marsh, Joseph A.
1901 Marshall, Charles H.
1897 *Marshall, Louis.*
1898 Marston, Edwin S.
1875 *Martin, Bradley.*
1888 *Martin, Oswald J.*
1889 Martin, Robert C.
1905 Mason, Amos Lawrence, M.D.
1888 *Mason, Alexander T.*
1901 Mather, Samuel.
1901 Matthews, Albert.
1899 Matthews, George E.
1902 Matthews, M. A., D.D.
1903 Maxwell, Francis Taylor.
1901 Maxwell, Robert.
1905 Meeker, Stephen J.
1891 Meeks, Edwin B.
1902 *Mellen, Charles S.*
1903 Mellon, Charles H.
1904 Mellor, Charles C.
1904 Meredith, William T.
1904 Mergentime, J. H.
1874 *Merrall, William J.*
1905 Merrill, Fullerton.
1905 Metcalf, Orlando.
1905 Meyer, August R.
1901 Meyer, Harry H.
1897 Millar, George W.
1901 *Miller, Dr. George N.*
1892 *Mills, A. G.*
1880 *Mills, Darius O.*
1875 Mitchell, Edward.
1899 Mitchell, John Murray.
1876 Mitchell, W. Howard.
1905 Mixer, Frederick K.
1905 *Mohr, Louis.*
1902 Monks, John, Jr.
1890 Montant, Alphonse.
1905 Moody, Arthur Blair.
1859 *Moore, Frank.*
1904 *Moore, John Bassett.*

Date of Election.

1884 *Moore, Joseph, Jr.*
1863 *Moore, W. H. H.*
1883 Morgan, E. D.
1874 *Morgan, J. Pierpont.*
1901 *Morgan, J. P., Jr.*
1887 *Morgan, William Fellowes.*
1889 Morgan, William H.
1859 *Morrell, W. H.*
1900 Morris, Fordham.
1874 *Morris, Henry Lewis.*
1905 *Morris, James.*
1903 Morris, John.
1898 *Morris, Newbold.*
1897 Morris, Robert T., M.D.
1905 Morrison, Charles E.
1902 *Mortimer, Rev. Dr. Alfred G.*
1864 *Morton, Levi P.*
1898 Moss, Charles H.
1905 Mount, William D.
1905 Murray–Aaron, Dr. Eugene.
1904 Myers, Joseph G.
1888 Myers, Theodore W.
1901 Myers, Mrs. Theodorus Bailey.

1895 Nason, Carleton W.
1901 Neeser, John G.
1886 *Neftel, William B., M.D.*
1891 Neukirch, Chas.
1897 Nevers, George G.
1899 Newbold, Clement Buckley.
1897 *Newell, F. H.*
1891 *Newman, Mrs. Angeline Ensign.*
1899 Newton, James S.
1897 Nichols, George L.
1892 Nichols, O. F.
1902 Nicolas, Louis J.
1899 Nimmo, Joseph, Jr.
1897 Nixon, Lewis.
1897 Notman, George.
1886 Notman, John.
1902 Noyes, Daniel Rogers.
1905 *Noyes, Isaac Pitman.*
1889 Nunn, R. J., M.D.

1888 *Oakes, T. F.*
1898 Obermeyer, Joseph.
1879 *O'Brien, Thomas S.*
1903 O'Connor, Harry L.
1901 O'Connor, Nicholas R.
1875 *O'Connor, Thomas H.*

Date of Election.
1887 *Ogden, William B.*
1879 O'Gorman, Richard.
1897 Ohman, August R.
1901 O'Leary, H. A.
1905 *Olyphant, Robert.*
1874 Olyphant, Robert M.
1875 *Opdyke, William S.*
1893 Operti, Albert.
1882 Oppenheim, Edward L.
1889 Orr, Alexander E.
1901 *Orvis, Charles E.*
1903 Osborn, Eugene E.
1905 Osborn, William Church.
1901 Outerbridge, Paul.
1903 Overstreet, William I.
1896 Owen, James, C.E.
1895 *Owen, Miss Luella A.*

1905 *Packard, Ralph G., Jr.*
1898 *Paget, Almeric H.*
1901 Paige, Edward Winslow.
1897 Palmer, N. F.
1889 Palmer, Stephen S.
1899 *Parish, Edward C.*
1872 *Parish, Henry.*
1905 Parish, Henry, Jr.
1905 *Park, Trenor L.*
1902 *Parker, James H.*
1905 Parks, C. W., C.E., U.S.N.
1886 Parris, Edward L.
1882 *Parrish, James C.*
1905 Parsell, Henry V. A.
1882 *Parsons, Mrs. Edwin.*
1897 *Parsons, George.*
1882 Parsons, John E.
1902 Paton, David.
1897 *Paton, William Agnew.*
1903 Patterson, Charles Brodie.
1901 Paulding, Gouverneur, II.
1901 Pech, Dr. James.
1889 Peck, Charles E.
1905 Peck, W. A.
1905 Peirce, James Mills.
1898 *Pell, Frederick A.*
1901 Pell, Stephen H. P.
1874 Penfold, William Hall.
1905 Pennell, William W., M.D.
1898 Pennington, William.
1903 Pepper, C. H.
1887 Perdicaris, Ion.

Date of Election.
1890 *Perkins, W. H.*
1894 Perry, John G., M.D.
1901 Perry, Dr. Safford Goodwin.
1888 Perry, William A.
1891 Peters, Edward McClure.
1887 Peters, Samuel T.
1903 *Peters, William Richmond.*
1903 *Pfizer, Charles.*
1901 *Phelps, John J.*
1902 *Phipps, Lawrence C.*
1887 *Phoenix, Lloyd.*
1886 *Phoenix, Phillips.*
1889 *Pickering, Edward C.*
1895 Pickhardt, Carl.
1902 Pierce, Henry Clay.
1905 Pierce, Robert Morris.
1893 Pinchot, Gifford.
1880 Pinchot, James W.
1891 Pincus, Frederick S.
1898 Piorkowski, Capt. A. E.
1903 Pitkin, Albert J.
1885 *Planten, John R.*
1893 *Platt, J. D.*
1882 Platt, Thomas C.
1904 Plimpton, George A.
1905 Plimpton, Dr. Warren O.
1876 Plum, James R.
1890 *Plumb, Edward L.*
1905 Plumb, Robert E.
1884 *Plush, Dr. Samuel M.*
1903 Poggenburg, Henry F.
1890 Poor, Henry W.
1891 *Porter, Henry Kirke.*
1903 Porter, Russell W.
1897 Porter, William H.
1905 *Post, Abram S.*
1884 Post, George B.
1885 *Post, William Henry.*
1890 Potter, Edward Clarkson.
1898 Potter, Frederick.
1901 *Potts, Jesse W.*
1903 *Potts, Thomas.*
1891 Powel, De Veaux.
1905 Powell, William R.
1880 Powell, Wilson M.
1899 Pratt, Wallace.
1897 Pray, Joseph M.
1897 Prentiss, George Lewis.
1901 Prince, J. Dyneley.
1903 Proctor, George H.

Date of Election.
1903 Proudfit, Frank F.
1886 Pryer, Charles.
1901 Purdy, J. Harsen.
1889 Putnam, George L.
1897 Putnam, Samuel.
1903 *Pyle, James Tolman.*
1894 *Pyne, M. Taylor.*
1898 *Pyne, Percy R.*

1904 Quelle, Otto
1898 Quincy, Miss Mary Perkins.

1905 Rand, Charles Franklin, M.D.
1903 *Randolph, Evan.*
1882 Rathborne, Charles L.
1868 *Raven, Anton A.*
1905 *Raven, John Howard, D.D.*
1903 *Raven, Richard M.*
1898 *Rawson, Edward Stephen.*
1890 Raymond, Charles H.
1886 *Raymond, R. W.*
1902 Rea, Samuel.
1901 *Rea, Thomas B.*
1902 *Ream, Norman B.*
1905 Reckefus, Charles H. Jr., M.D.
1898 Redding, Joseph D.
1903 Reed, Charles.
1874 Reid, Whitelaw.
1901 Reiff, Josiah C.
1897 Reinhart, Joseph W.
1903 Reno, Jesse W.
1888 Renwick, Edward S.
1905 Reynes, Antonio.
1874 *Reynes, Jaime.*
1898 Reynolds, J. B.
1903 *Reynolds, James B.*
1882 Rhinelander, Charles E.
1898 *Rhinelander, Miss Serena.*
1888 Rhinelander, William.
1874 Rhoades, John Harsen.
1886 *Rice, Isaac L.*
1874 *Richard, Auguste.*
1903 Richard, Edward A.
1901 Riker, John L.
1901 Riker, Samuel.
1874 Riker, William J.
1901 Rives, George Barclay.
1887 *Robb, J. Hampden.*
1903 Robin, Joseph G.
1872 *Robbins, Chandler.*

Date of Election.
1891 Robbins, Miss Harriet L.
1901 *Robertson, Julius.*
1880 *Robinson, Mrs. John A.*
1901 *Robinson, Nelson.*
1905 Robinson, Seth B.
1888 Robinson, William M.
1903 Roe, Albert S.
1890 Roe, Major-Gen. Charles F.
1889 *Roelker, Alfred.*
1903 Roelker, William Greene.
1887 *Rogers, Archibald.*
1905 Rogers, Edward L.
1903 *Rogers, Robert.*
1896 Roncière, St. Croix de la.
1905 *Roosevelt, Franklin Delano.*
1868 Rose, Cornelius.
1903 Ross, Morgan R.
1905 Rossington, W. H.
1903 Rossiter, Clinton L.
1895 Rouse, Henry C.
1887 *Rowell, George P.*
1883 *Rowland, Thomas F.*
1897 *Rubino, Jacob.*
1905 Ruprecht, Philip.
1897 Rusch, Henry A.
1899 Russak, Frank.
1899 Russak, Jacob.
1874 *Russell, Archibald D.*
1889 Ryan, Thos. F.

1905 Sachs, Samuel.
1888 *Salisbury, Stephen.*
1898 Salomon, William.
1901 *Sampson, Alden.*
1904 Sampson, Charles E.
1875 *Sandford, Elliott.*
1895 Sands, Robert C.
1878 *Sands, William R.*
1895 Sanford, Robert.
1886 Satterlee, F. LeRoy, M.D.
1903 *Satterlee, Herbert L.*
1904 Saul, Charles R.
1903 Saul, Lester J.
1870 *Schafer, Samuel M.*
1897 Schaus, Hermann.
1890 Schell, F. Robert.
1874 *Schermerhorn, F. Augustus.*
1890 Schernikow, Ernest.
1898 *Schieffelin, George R.*
1875 *Schiff, Jacob H.*

Date of Election.
1902 *Schiff, Mortimer L.*
1903 Schirmer, Gustave.
1903 Schirmer, Rudolph E.
1903 Schloss, Henry W.
1885 Schmelzel, William R.
1901 Schmid, Dr. H. Ernest.
1905 *Schott, Charles M., Jr.*
1888 *Schultze, John S.*
1877 Schuyler, Philip.
1882 *Schuyler, Spencer D.*
1902 *Schwab, Charles M.*
1903 Scott, Edward W.
1883 Scott, Rufus L.
1895 Scudder, Moses L.
1897 See, Horace.
1905 Scull, Harry.
1887 Seligman, DeWitt J.
1901 Seligman, Isaac N.
1887 Sellew, T. G.
1903 *Sells, Elijah W.*
1901 Senter, J. Herbert.
1902 Seward, Frederick W.
1898 Seward, George F.
1898 Seward, Gen. William H.
1893 *Sexton, Edward Bailey.*
1871 Shaler, Major Gen. Alexander.
1897 *Shardlow, Joseph.*
1903 Shaughnessy, Sir Thomas G.
1893 Shaw, Charles A.
1901 Shaw, N. Archibald, Jr.
1895 Shaw, W. M.
1897 Sheehy, W. H.
1905 Sheffield, George St. John.
1888 Sheldon, Edwin B.
1888 *Sherman, Charles A.*
1905 *Sherman, Gardner.*
1886 *Sherman, George.*
1865 Sherman, W. Watts.
1903 Sherwood-Dunn, B.
1898 Shillaber, William, Jr.
1903 Shippy, Henry L.
1887 Shortall, John G.
1876 *Sibley, Hiram W.*
1899 Siebert, Wilbur H.
1903 *Siegel, Henry.*
1903 Siegel, Jacob.
1890 Simonson, William H.
1903 Simpson, Ernest L.
1898 Simpson, William T.
1883 *Sinclair, John.*

Date of Election.
1905 Skinner, Robert Peet.
1901 Slade, William G.
1874 Sloan, Samuel.
1899 Smiley, Albert K.
1901 Smillie, Charles F.
1893 Smith, Benjamin E.
1890 *Smith, Sir Donald A.*
1893 Smith, D. Cady.
1902 Smith, Dr. E. Fayette.
1879 *Smith, E. Reuel.*
1905 Smith, Frederick E.
1899 Smith, J. Frailey.
1887 Smith, James Rufus.
1887 Smith, Nathaniel S.
1901 Smith, Ormond G.
1889 Smith, Philip Sherwood.
1878 Smith, S. Newton.
1883 Smith, William Alexander.
1895 Smith, W. Wheeler.
1902 Smyth, Henry Lloyd.
1890 Snow, Elbridge G.
1903 Snow, Fred W.
1905 Snow, Marshall S.
1895 Sorchan, Victor.
1904 Soulsby, Basil Harrington, B.A., F.S.A., F.R.G.S.
1880 *Southwick, Henry K.*
1883 Spence, Lewis H.
1905 Spencer, Edwards.
1905 Spencer, Henry B.
1905 *Speyer, James.*
1856 Spofford, Paul N.
1904 Squires, Grant.
1897 Standish, Myles.
1891 Stanton, John.
1904 Starr, Hyman.
1892 Starr, Theodore B.
1903 Steinway, Frederick T.
1888 Stephens, Benjamin.
1883 Stern, Louis.
1887 Sterry, George E.
1904 *Sterry, John De Witt.*
1879 Stetson, Francis Lynde.
1887 *Stetson, George W.*
1879 *Stevens, Frederick W.*
1887 Stevens, George T., M.D.
1901 Stevenson, Edward Luther, Ph.D.
1898 Stevenson, Paul Eve.
1895 Stevenson, R. W.
1905 Stewart, John H. J.

Date of Election.

1887 Stewart, Lispenard.
1878 Stewart, William Rhinelander.
1901 *Stickney, Charles D.*
1891 Stieglitz, Edward.
1905 Stillwell, Arthur E.
1905 Stillwell, Lewis Buckley.
1897 Stine, Marcus.
1904 Stockbridge, Henry.
1904 Stokes, Anson Phelps.
1892 Stokes, I. N. Phelps.
1884 Stokes, James.
1895 Stone, Mason A.
1883 Stone, Sumner R.
1889 Straus, Isidor.
1903 Strauss, Frederick.
1904 Strong, George A.
1904 Stuck, Rev. Hudson.
1873 Sturges, Frederick.
1875 Sturges, Henry C.
1901 Sturges, William C.
1873 *Sturgis, Frank K.*
1901 Sturgis, Thomas.
1874 Stuyvesant, Robert R.
1872 *Stuyvesant, Rutherfurd.*
1891 *Suckley, Robert B.*
1887 Sutton, J. Ford, D.D.
1903 Sutton, James F.
1893 Swayne, Francis B.
1905 Swords, Henry C.

1882 *Tailer, Edward N.*
1877 *Talcott, James.*
1889 Tatham, Charles.
1902 Taylor, Charles H., Jr.
1868 Taylor, Douglas.
1902 Taylor, Frederick F.
1895 Taylor, George.
1903 Taylor, Henry R.
1901 Taylor, Walter C.
1882 *Terry, John T.*
1876 *Terry, Rev. Roderick.*
1901 Terry, Walter Phillips.
1900 Tesla, Nikola.
1883 Thalmann, Ernest.
1891 Thaw, Benjamin.
1905 *Thebaud, Paul G.*
1897 Thomas, Geo. C.
1898 Thompson, D. W.
1904 *Thompson, Mrs. Frederick F.*
1902 Thompson, John C.

Date of Election.

1901 *Thompson, Lewis S.*
1898 Thompson, Walter.
1902 *Thomson, Elihu.*
1886 Thorne, Jonathan.
1890 Thorne, Samuel.
1890 Thorp, John R.
1893 *Tichenor, Francis M.*
1885 Tiffany, C. C., D.D.
1891 *Tobey, Gerard C.*
1901 Todd, Rev. William E.
1897 Tonnelé, Walter.
1905 Townsend, J. Henry.
1900 Tracy, J. Evarts.
1893 Trusdell, Warren N.
1899 *Tucker, George F.*
1901 *Tuckerman, Alfred.*
1901 Tuckerman, Paul.
1884 Turner, J. Spencer.
1900 Turnure, George.

1888 *Uhl, Edward.*
1905 Uhle, John B.
1905 Ulich, H. P.
1891 Ullmann, Emanuel S.
1891 Ulmann, Ludwig.
1897 *Underhill, Eugene.*
1897 Untermyer, Maurice.

1890 Valentine, Ferdinand C., M.D.
1887 *Van Alen, J. J.*
1897 Van Antwerp, William C.
1901 van Beuren, F. T., Jr., M.D.
1870 *Van Brunt, Charles H.*
1889 *Vanderbilt, George W.*
1878 *Vanderbilt, William K.*
1895 Vanderpoel, Waldron B., M.D.
1876 Van Hoesen, George M.
1900 Van Holland, Henry.
1902 *Van Rensselaer, A.*
1905 Van Sinderen, Howard.
1887 *Van Slyck, George W.*
1891 *Van Winkle, Edgar B.*
1903 Veit, Richard C.
1887 Verastegui, Alberto de.
1888 Ver Planck, Wm. G.
1900 *Vetter, Dr. Charles.*
1901 von Briesen, Arthur.
1875 *von Post, Herman C.*
1903 von Schmid, J. O.
1899 Vorse, Albert White.
1902 Vose, Edward N.

Date of Election.
1890 *Wadsworth, Herbert.*
1898 *Wadsworth, Wm. Austin.*
1905 Wainwright, John W., M.D.
1898 Wait, William B.
1898 Wales, C. M.
1900 Walker, Henry Freeman, M.D.
1898 Walker, William Augustus.
1905 Wallace, Dillon.
1903 Wallace, William H.
1898 Warburg, Felix M.
1905 Ward, John Gilbert.
1900 Wardwell, William T.
1902 *Warren, Samuel D.*
1895 Warren, William R.
1900 Washington, W. D'H.
1889 Waterbury, John I.
1898 *Watkinson, George.*
1879 *Watson, Francis A.*
1884 *Watson, George H.*
1905 *Watt, Archibald.*
1876 Wedemeyer, A. J. D.
1900 Weeks, John R.
1900 *Wehrhane, Charles.*
1903 Weir, Col. John.
1895 Wells, Charles W.
1905 Wells, Mrs. John.
1905 Wells, T. Tileston.
1897 Wenman, James F.
1901 Wentz, James M.
1898 Weston, Edward, Sc.D., LL.D.
1888 Wetmore, Edmund.
1874 *Wetmore, George P.*
1872 *Wetmore, William Boerum.*
1901 *Wetmore, W. S. K.*
1887 Wheelock, G. G., M.D.
1905 Whitaker, John E.
1903 White, Abraham.
1905 White, Alain C.
1868 White, Alexander M.
1887 White, Alfred T.
1887 White, Henry.
1886 White, Horace.
1887 *White, J. LeRoy.*
1886 *White, S. V.*
1887 White, William Augustus.
1905 White, William H.
1878 *Whitehead, Henry M.*
1901 Whitehouse, William FitzHugh, Jr.
1898 Whitfield, R. P.
1903 Whitney, Horace P.

Date of Election.
1891 Whitney, Milton B.
1902 *Whitney, W. Beaumont.*
1905 Whittier, Charles Albert.
1898 Wilkins, Hartwell A.
1901 *Willcox, David.*
1901 *Willets, Howard.*
1900 Willets, John T.
1905 Williams, Benjamin C.
1882 *Williams, David.*
1902 *Williams, John Skelton.*
1901 Williams, John T.
1901 *Williams, Timothy S.*
1905 Wilmerding, Gustav L.
1893 Wills, Charles T.
1903 Wilson, Henry R.
1870 *Wilson, Gen. James Grant.*
1905 Wilson, John E., M.D.
1905 Wing, Edward True.
1875 Winslow, Gen. Edward F.
1901 Winslow, John Flack.
1902 Winter, Emil.
1900 *Winthrop, Grenville L.*
1888 Witherbee, Frank S.
1891 Wolcott, Henry Roger.
1897 Wolff, Emil.
1905 Wood, Henry A. Wise.
1903 Wood, Henry R.
1905 Wood, Joseph.
1900 Wood, Orrin S.
1903 Wood, Rufus H.
1884 Wood, William H. S.
1898 Woods, Edward A.
1888 *Woodward, James T.*
1905 Wray, Albert A.
1904 Wright, J. Dunbar.
1886 Wright, William Phillips.
1902 *Wyckoff, Clarence F.*
1902 *Wyckoff, Edward G.*
1901 Wyckoff, William F.

1905 Yeisley, George C., D.D.
1891 Young, Edward L.
1895 Young, Richard N.

1884 *Zabriskie, Andrew C.*
1898 Zaring, Charles W.
1905 Zickel, S.
1900 *Ziegler, William.*
1905 Zucker, Peter.

BOOK NOTICES.

La Grande Route du Tchad. Par le Commandant E. A. Lenfant. xv and 288 pp., numerous half-tone Illustrations, a Map and 3 Appendices. Librairie Hachette & Co., Paris, 1905. (Price, 12 fr.)

Lenfant is still a young man, but he has accomplished everything he has tried to do in Africa. Early in 1903 he unfolded his idea that France might utilize a practically all-water route between the mouth of the Niger and Lake Chad, along streams in the Niger and Shari River basins, and that this route would afford the shortest and cheapest connections with the French Central Sudan. The mission to investigate the matter found favour in France, and Lenfant was soon on his way to Africa. The BULLETIN (1905, pp. 429–30) recorded the brilliant success that won for him a gold medal of the Paris Geographical Society.

The present book, beautifully produced by Hachette, is Commandant Lenfant's story of this eventful journey. It contains much fresh information about the regions traversed and the tribes. The illustrations have probably not been equalled in any other work relating to the Central Sudan. The author sums up the results of his many-sided studies, and in the Appendices are notes on the Fulani, a description by Mr. Lahure of his exciting side-trip to the Lake country, and the tabulated meteorological observations of the expedition.

Wirtschaftsgeographie von Niederländisch Ost-Indien. Von Professor Albrecht von Bockelmann. 88 pp. (Angewandte Geographie, Series 2, No. 2.) Gebauer-Schwetschke, Druckerei und Verlag. Halle a. S., 1904. (Price, M. 1.80.)

A fine example of applied geography. The book opens with twenty pages relating to the larger natural conditions throughout the Dutch East Indies; area, 58 times as great as that of the mother country; population, 4.8 times as large; large islands very mountainous; flat lands chiefly confined to a few small islands; rich soil the result of disintegrated volcanic rock; temperatures, plant and animal life, and distribution of races, native and foreign; Mohammedan religion most important and widely disseminated, and its adherents not so fanatical as in many other lands.

The so-called coast Malayan is the language of trade, having the same relation to business in the Dutch Indies that pidgeon English holds in West and ki-Suaheli in East Africa. Europeans learn it in about two months, and a large admixture of Dutch, English, and Portuguese expressions makes it easier to acquire. The state of education and all other conditions that affect trade are discussed.

Each of the seven island groups is then separately treated in every aspect that relates to commerce. The monograph is a model of compact statement and logical arrangement.

In Famine Land. Observations and Experiences in India during the Great Drought of 1899–1900. By Rev. J. E. Scott. xl and 206 pp., 35 half-tone Illustrations, a Map and Index. Harper & Brothers, New York and London, 1904. (Price, $2.50.)

Dr. Scott, who has spent most of his life in India, was prominent in the relief work during the great famine. His book records many phases of the social and physical life of the people and the conditions under which they live, as well as details

of the terrible calamity of which he was a witness. It was well that such a record be preserved, for the famine was doubtless the most widespread on record. It affected an area of about 400,000 square miles and 60,000,000 people, or about one-fifth of the entire population. No such complete failure of the rains was ever before recorded in India.

The author summarizes the great famines of India, describes their causes, and tells what is done to prevent them. He then describes the great famine, the new measures of relief that the Government put in force, the disposal of the dead in famine time, the poorhouses, the breaking of stone and other works started by the Government to give employment, and tells of the thousands of waifs, mostly children under twelve years of age, whose parents perished and who "were left a legacy to be fed, clothed and trained."

The book is largely a record of the vivid impressions and descriptions of eye-witnesses who were active in the work of relief. Facts, scenes, and incidents are presented from many of the centres where the distress was most acute. The photographs illustrate and interpret the famine, and the volume may be regarded as a conscientious, if not exhaustive, record of one of the greatest of calamities.

Le Peuplement Italien en Tunisie et en Algérie. Par Gaston Loth. 503 pp. and 34 Illustrations and Maps. Librairie Armand Colin, Paris, 1905.

The book is an exhaustive study of the rôle of the Italian immigrants in Tunis and Algeria. France has occupied Algeria less than seventy-five years and has been in Tunis scarcely twenty years. The author says that while the French have been the protectors of millions of native Mussulmans, they have seen great numbers of Spaniards settling in Oran and Italians debarking at Tunis and Algiers, drawn thither by the development of regions reputed to be very rich and fertile. These natives of southern Europe surpass the French in their ability to endure the fatigue of daily toil in the North African climate. French immigration has not equalled the hopes of the Government, while thousands of Spaniards and Italians are landing in these countries every year.

Prof. Loth's investigation has been confined to the Italian settlers. He thinks that in Algeria their assimilation with the French colonists will soon be complete. They are living side by side with the French, who are rather in the majority. On the other hand, the Sicilians who have removed to Tunis are the preponderating foreign element, and the few thousands of French there exert over them a less potent influence. The author suggests measures which he believes may ultimately bring about a fusion of interests between the French and Italians of Tunis, such as is now in progress in Algeria.

Across the Great Saint Bernard. By A. R. Sennett. xvi and 555 pp., 11 plates and 159 other illustrations, 4 Appendices and Index. Bemrose & Sons, Ltd., London, 1904. Price, 6s.

The book includes a variety of information about the Alps. The author is a keen observer and a thoughtful guide, and his work will be useful both to the tourist and to those who roam the Alps only in fancy. His description of the hospice of St. Bernard will be especially interesting to Americans, most of whom learned the story of the rescue band of St. Bernard dogs in their school readers. Incidentally the author includes in his book a good deal of physical geography simply written and attractively presented.

BULLETIN

OF THE

AMERICAN GEOGRAPHICAL SOCIETY.

Vol. XXXVII 1905. No. 7

THE CLIMATIC ZONES AND THEIR SUBDIVISIONS.*

BY

ROBERT DeC. WARD,

Harvard University.

(Synopsis.)

Classification by latitude circles: the five classic zones; *Clima* as used by the Greeks; Ptolemy's climates; Parmenides; Polybius; Posidonius; Aristotle; Eudoxus; Strabo; Hippocrates.—Temperature zones: Supan; Köppen; Gebelin.—Wind zones: Davis; Woeikof.—Summary and conclusions.—Necessary subdivisions of the zones.

Classification by Latitude Circles.—So great is the variety of climates to be found in different parts of the world that it has long been customary to classify these climates roughly into certain broad belts. These are the climatic zones. A simple grouping of this kind can, however, obviously take account only of the most general characteristics of the climates which are included within each zone. The five zones with which we are most familiar are the so-called torrid, the two temperate, and the two frigid zones. The torrid, or better, the tropical zone, naming it by its boundaries, is limited on the north and south by the two tropics of Cancer and Capricorn, the equator dividing the zone into two equal parts. The temperate zones are limited towards the equator by the tropics, and towards the poles by the Arctic and Antarctic circles. The two frigid, or better, the two polar zones, are caps covering both polar regions, and bounded on the side towards the equator by the Arctic and Antarctic circles.

* The following books have been made use of, in addition to the references mentioned in the foot-notes:

W. M. Davis: Elementary Meteorology, 334–335.
J. Hann: Handbuch der Klimatologie, II, 3–9.
W. Köppen: Klimalehre, 104–106.
A. Woeikof: Die Klimate der Erde, 327.

These five zones are classified on purely astronomical or mathematical grounds. They are really zones of sunshine, or of solar climate. Within the tropical zone the sun reaches the zenith at two different times in the year; its greatest possible zenith distance is 47°; the day is never less than ten and a half hours long. On the tropics themselves, the sun reaches the zenith but once a year. In the polar zones the sun is below the horizon for twenty-four hours at least once in winter, and is above the horizon for the same length of time at least once in summer. On the polar circles the noon altitude of the sun decreases to 0° on the shortest day. The temperate zone has conditions between these two extremes. At no point can the sun be in the zenith; nor, except on the polar circles, is there ever anywhere a twenty-four hour day or night.

The tropical zone has the least annual variation of insolation. It has the maximum annual amount of insolation. Its annual range of temperature is very slight. It is the summer zone. Beyond the tropics the contrasts between the seasons rapidly become more marked. The polar zones have the greatest variation in insolation between summer and winter. They also have the minimum amount of insolation for the whole year. They may well be called the winter zones, for their summer is so short and cool that the heat is insufficient for most forms of vegetation, especially for trees. The temperate zones are intermediate between the tropical and the polar in the matter of annual amount and of annual variation of insolation. Temperate conditions do not characterize these zones as a whole. They are rather the seasonal belts of the world. These five zones further differ more or less from one another in the character of their animals and plants and in the conditions of human life within their boundaries.

Taking the area of a hemisphere as unity, the relative areas of these zones are as follows:

Tropical	0.40
Temperate	0.52
Polar	0.08

This subdivision of the earth's surface on the basis of the geometrical distribution of sunshine dates from the time of the early Greek philosophers and geographers, but it is impossible to determine with certainty just when and by whom the various suggestions in this connection were made.*

* Hugo Berger: *Geschichte der wissenschaftlichen Erdkunde der Griechen* (2d Ed. Leipzig, 1903), gives a discussion of the history of zonal classifications among the Greeks. See also H. Kiepert: *Lehrbuch der alten Geographie*, *Berlin*, 1878.

The word *clima* as used by the Greeks originally referred to the supposed slope of the earth toward the pole. It later came to be used, probably after Aristotle's time, as about equivalent to our *zone*, but did not at first have the same meaning as that word has with us. It was simply a mathematical or an astronomical term, and was not associated with any idea of physical climate. A change of location, to a place where the day was half an hour or an hour longer than at the starting-point, meant in those days a change of *climate.* Change of latitude was, however, gradually seen to mean change of temperature as well as change in length of day, and thus the word *clima* came to have its present meaning.* The division into climates was first applied to the northern hemisphere only, as there was no practical knowledge of the southern hemisphere.

An excellent illustration of the ancient meaning of the word *clima* is found in the system of climates proposed by the famous geographer Ptolemy, who lived in the second century A.D. Ptolemy used different schemes at different times, but the essential was a division of the earth's surface between equator and north pole into a series of climates, or parallel zones, separated by latitude circles and differing from one another simply in the length of their longest day. In the lower latitudes the breadth of a *clima* was fixed by the difference of a quarter of an hour in the length of the longest day, but in higher latitudes differences of half an hour, an hour, and finally a month, were the determining factors. Ptolemy's subdivision of the earth's surface was really nothing but an astronomical climatic table.†

Parmenides, who flourished about the middle of the fifth century B. C. proposed a five-zone division of the earth's surface not very unlike our present system. These zones were a torrid zone, uninhabitable because of heat; two frigid zones, uninhabitable because of cold; and two intermediate zones, of moderate temperature, suitable for man. The exact limits assigned to these zones are not known with certainty; but it is reasonable to suppose that the Arctic circle was even then recognized as a natural boundary for the north polar zone, and it is pretty clear that the temperate zone was much smaller, and the torrid zone much larger, than in our present classification. (See Fig. 1.‡)

---

* Century Dictionary.

† F. A. Ukert: *Geographie der Griechen und Römer von den frühesten Zeiten bis auf Ptolemäus* (Weimar, 1816), Vol. 1, Part 2, p. 187, gives a tabulated scheme of Ptolemy's climates. See also Encyclopædia Britannica, article *Climate.*

‡ From H. Berger: *Geschichte der wissenschaftlichen Erdkunde der Griechen.* 2d Ed., Leipzig, 1903, p. 211.

The exact boundaries of the different zones varied more or less for some time, as astronomical knowledge became more and more exact, and as the habitable area of the earth's surface was gradually extended, but the scheme was generally adopted by later writers. Polybius (born about B. C. 204), however, divided his torrid zone into two parts by the equator, and Posidonius (born about B. C. 135) divided his torrid zone into three parts, making six and seven zones respectively. Aristotle (born B. C. 384) limited the torrid zone by the tropics and the north temperate zone by the Arctic circle, but there is doubt whether he really meant the fixed Arctic circle which we know. He believed both temperate zones habitable,* thus limiting the uninhabitable area to the astronomical tropical zone. Eudoxus, of Cnidus, who lived about B. C. 366, used a division of a quadrant of the earth's circumference into fifteen parts, of which four belonged to the torrid, five to the temperate, and six to the frigid zone. The Tropics were thus fixed at latitude 24°. Strabo (born about B. C. 54), opposed the prevailing view that the whole torrid zone, between the tropics, was uninhabitable, and also first clearly set forth the opinion that the temperature decreases with increasing altitude above sea-level, as well as with increasing latitude. As early as about 400 B. C., Hippocrates had endeavoured to show a causal relation between sunshine and the topography of a district on the one hand and the characteristics of its inhabitants on the other.†

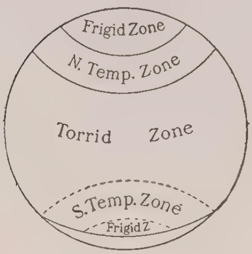


FIG. 1.—THE ZONES IN THE TIME OF PARMENIDES.

Temperature Zones.—The classification of the climatic zones on the basis of the geometrical distribution of sunshine serves very well for purposes of simple description, but a glance at any isothermal chart shows at once that the isotherms do not coincide with the latitude lines. In fact, in the higher latitudes, the former often follow the meridians more closely than they do the parallels of latitude. The astronomical zones—*i. e.*, the zones of light—therefore differ a good deal from the zones of heat. Hence it has

* H. F. Tozer: *A History of Ancient Geography*, Cambridge, 1897, 179–180.

† The older views regarding the climates and the habitability of the five zones were thus stated by Virgil (Georgics I, 233–239, Translation by Davidson): "Five zones embrace the heavens; whereof one is ever glowing with the bright sun, and scorched forever by his fire; round which the two furthest ones to the right and left are extended, stiff with cerulean ice and horrid showers. Between these and the middle zones, two by the bounty of the gods are given to weak mortals; and a path is cut through both, where the series of the signs might revolve obliquely."

naturally been suggested that the zones be limited by isotherms rather than by parallels of latitude, and that a closer approach be thus made to the actual conditions of climate.

Supan* (see Fig. 2) has suggested limiting the hot belt, which corresponds to, but is slightly greater than, the old torrid zone, by the two mean annual isotherms of 68°—a temperature which approximately coincides with the polar limit of the trade winds and with the polar limit of palms. The latter is considered by Grisebach to be the truest expression of a tropical climate. The hot belt widens somewhat over the continents, chiefly because of the mobility of the ocean waters, whereby there is a tendency towards an equalization of the temperature between equator and poles in the oceans,

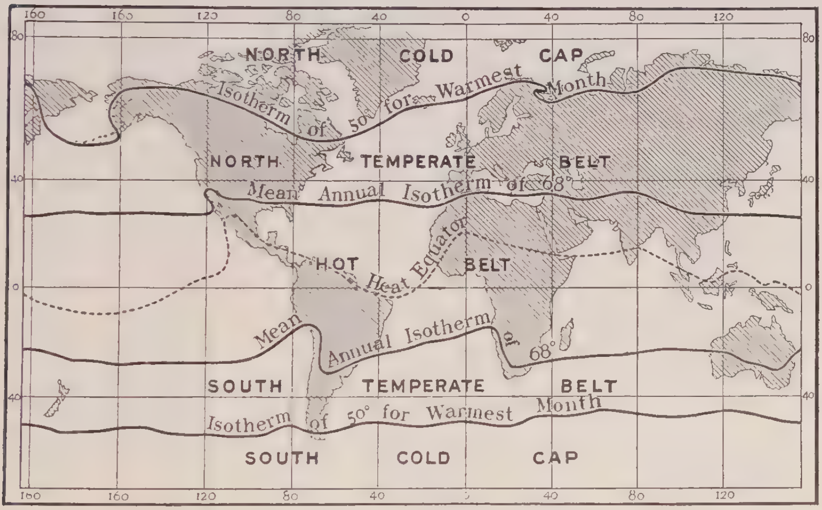


FIG. 2.—TEMPERATURE ZONES AFTER SUPAN (1896).

while the stable lands acquire a temperature suitable to their own latitude. Furthermore, the unsymmetrical distribution of land in the low latitudes of the northern and southern hemispheres results in an unsymmetrical position of the hot belt with reference to the equator, the belt extending further north than south of the equator. The polar limits of the temperate zones are fixed by the isotherm of 50° for the warmest month. This is a much more satisfactory limit than the mean annual isotherm of 32°, which has also been suggested, for climates differing very widely from one another are found to have the same mean annual temperature of 32°. Summer heat is more important for vegetation than winter cold, and

* A. Supan: *Grundzüge der physischen Erdkunde.* Leipzig, 1896, 74–77.

where the warmest month has a temperature below 50°, cereals and forest trees do not grow, and man has to adjust himself to the conditions in a very special way. The two polar caps are not symmetrical as regards the latitudes which they occupy. The presence of extended land masses in the high northern latitudes carries the temperature of 50° in the warmest month farther poleward there than is the case in the corresponding latitudes occupied by the oceans of the southern hemisphere, which warm less easily and are constantly in motion. Hence the southern cold cap, which has its equatorial limits at about lat. 50° S., is of much greater extent than the northern polar cap. So far as this south polar zone is concerned, the presence or absence of an Antarctic continent is immaterial; for such a land mass must be ice-covered, and hence cannot operate to raise the temperature as in the case of a land surface to which the sun's rays have immediate access. The northern temperate belt, in which the great land areas lie, is much broader than the southern, especially over the continents. These temperature zones emphasize the natural conditions of climate more than can be the case in any subdivision by latitude circles, and they bear a fairly close resemblance to the old zonal classification of the Greeks.

Another, much more detailed classification, also proposed by Supan* (see Fig. 3), is as follows:

A. A warm zone, between the mean annual isotherms of 68°. This is subdivided into (*a*) a tropical belt, bounded on the north and south by the isotherm of 68° for the coldest month; (*b*) an extra-tropical belt, between the isotherm of 68° for the coldest month and the mean annual isotherm of 68°.

B. A temperate zone between the mean annual isotherms of 68° and 32°. This is subdivided into (*a*) the equatorial belt of the temperate zone, between the mean annual isotherms of 68° and the isotherm of 32° for the coldest month; (*b*) the polar belt of the temperate zone, beyond the isotherm of 32° for the coldest month.

C. A cold zone, on the polar side of the mean annual isotherm of 32°, characterized by permanently frozen ground. This is subdivided into (*a*) the equatorial belt of the cold zone, between the mean annual isotherm of 32° and the isotherm of 32° for the warmest month; (*b*) the polar belt of the cold zone, on the polar side of the isotherm of 32° for the warmest month.†

---

* A. Supan: *Die Temperaturzonen der Erde*, Peterm. Mitth., XXV, 1879, 349–358.

† It may be noted that the isotherm of 32° is not found at sea-level in the July isothermal chart of the north polar regions (*Atlas of Meteorology*, Pl. 4). The isotherms in Fig. 3 are reproduced as originally drawn by Supan, and have not been changed to accord with recent observations.

The temperate zone, in this scheme, is smaller than that between the tropics and the polar circles. Both the other zones are larger than in the classic divisions. The ratio of the warm zone as a whole (*i. e.*, in both hemispheres), as compared with the temperate and cold zones in each hemisphere, is about as follows: Warm zone, 8; temperate zone, 3; cold zone, 1. As Hann has pointed out,* these temperature zones are no less unfortunately named in the higher latitudes than are the classic zones, for the reason that the mean annual temperature in a marine climate has a very different climatic significance from that of the same temperature in a continental climate. For example, southeastern Siberia and the larger portion

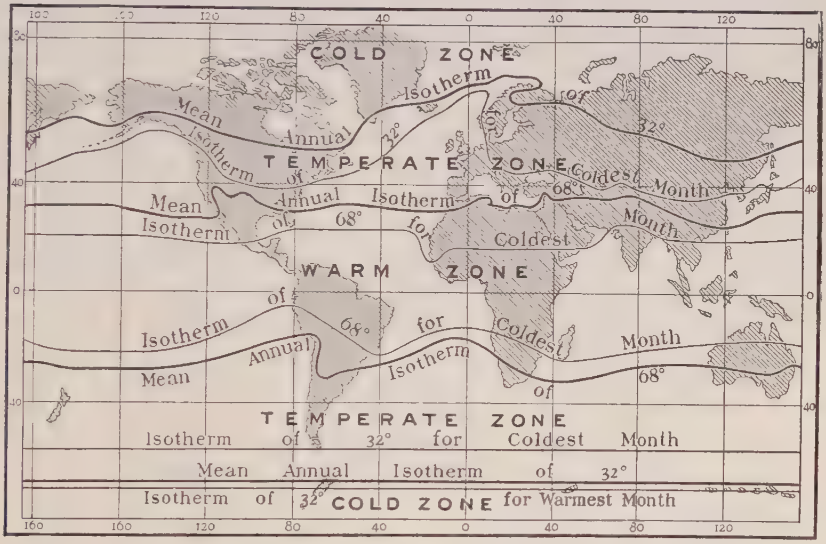


FIG. 3.—TEMPERATURE ZONES AFTER SUPAN (1879).

of the Amoor territory are in the cold zone of Supan, although the summer temperature is higher than in central Germany. In the former region we find lofty forest trees, agriculture and cattle-raising, and in northern Manchuria deciduous forests grow on the lowlands. Again, although this district has the same mean annual temperature as central Greenland, there is the greatest difference in vegetation and in habitability. In high latitudes neither the mean annual temperature nor the temperature of the coldest month is nearly as important a climatic control over vegetation as is the temperature of summer, from the point of view of climate as a whole, and especially in relation to organic life. The summer tem-

* J. Hann: *Handbuch der Klimatologie*, 1897, II, 6–7.

peratures determine habitability, the limits of plant growth, and the general conditions of human life. Hence, in the higher latitudes, zones bounded by mean annual isotherms are no great improvement over zones limited by latitude circles.

Another classification of temperature zones has been suggested by Köppen* (see Fig 4, facing p. 385).

Here the length of time during which the temperature remains within certain fixed limits, these limits having well-marked relations to organic life, is taken into account. Two critical daily mean temperatures, 68° and 50°, and the duration of these temperatures for periods of one, four, and twelve months, are the factors in this classification. These temperatures are not reduced to sea-level. A normal duration of a temperature of 50° for less than a month fixes very well the polar limit of trees and the limits of agriculture. Near this line are found the last groups of trees in the tundras. A temperature of 50° for four months marks the limit of the oak, and also closely coincides with the limits of wheat cultivation. North of the tree limit agriculture ceases, and man's food is to be sought very largely in the sea. With the approach to this line the period of plant growth is shortened more and more, agricultural operations become restricted, and occupations of other kinds are taken up. These critical temperatures and their varying periods of duration form the basis of the following classification:

1. Tropical belt: all months *hot* (over 68°). This is almost altogether within the tropics; it reaches, in round numbers, from latitude 20° N. to 16° S.
2. Sub-tropical belts: 4 to 11 months hot (over 68°); 1 to 8 months *temperate* (50°–68°).
3. Temperate belts: 4 to 12 months temperate.
4. Cold belts: 1 to 4 months temperate; the rest *cold* (below 50°).
5. Polar belts: all months cold.

The temperate belts of both hemispheres are further subdivided into three districts†—the steadily temperate belt‡ is found only on the oceans; the belt of hot summers§ only on the continents, and the third, with moderate summers and cold winters,** extends

---

* W. Köppen: *Die Wärmezonen der Erde, nach der Dauer der heissen, gemässigten und kalten Zeit und nach der Wirkung der Wärme auf die organische Welt betrachtet.* Met. Zeitschr., I, 1884, 215–226. Chart.

† All characterized by having at least four months temperate (50°–68°), and not more than four months hot (over 68°).

‡ No month over 68° or below 50°.

§ Has temperatures below 50° for one or more months.

** Has less than four months, but not less than one month, temperate (50°–68°).

around the world, with the exception of a notable interruption over Siberia.

In the second of these subdivisions, except in eastern North America and Asia, the rainfall is generally deficient; irrigation is more or less necessary, and deserts and steppes characterize the continental portions. Only in the monsoon districts of southern and eastern Asia, of Brazil, and of southeastern North America, do we find high temperatures combined with high relative humidity. The third subdivision above noted is now the chief seat of human development. Over a large part of the cold belt of the northern hemisphere the ground is permanently frozen, only thawing a little on the surface in summer. Nevertheless, in portions of it trees and hardy cereals grow. The polar belts are, as a whole, outside the limits of tree growth.

Another suggestion has been made by Gebelin,* who has proposed to select, as limits of the temperate zone, certain visible geographical boundaries, in contrast with the ideal climatic limits based upon the distribution of sunshine. On the oceans, the tropical circles serve as acceptable boundaries on the sides towards the equator, but on the continents the desert belts on both sides of the tropics are reasonable limits, although these deserts do not reach the eastern coasts of the continents. For the polar limits of the temperate zone the tundras are chosen on the continents, and the summer ice-masses on the oceans.

Wind Zones.—While a simple classification of the zones on the basis of temperature is an improvement upon any rigid scheme of division by latitude circles, the heat zones emphasize the element of temperature to the exclusion of such important elements as winds and rainfall. So distinctive are the larger climatic features of the great wind belts of the world, that a classification of climates according to wind systems has been suggested.† As the rain-belts of the world are closely associated with these wind systems, a classification of the zones by winds also emphasizes the conditions of rainfall. In such a scheme, the torrid, or tropical, zone, with its regularity of weather through the year, and the comparative simplicity of its climatic features, is bounded on the north and south by the margins of the trade-wind belts, and is therefore larger than the classic torrid zone. This trade-wind zone is somewhat wider on the eastern side of the oceans, and properly includes within its

* J. Gebelin. *Les Limites géographiques du climat tempéré.* Communication faite au Congrès National des Sociétés françaises de Géographie le 6 Août, 1895. Bordeaux, 1896.

† W. M. Davis. *Elementary Meteorology.* Boston, 1894, 334–335.

limits the equable marine climates of the eastern margins of the ocean basins, even as far north as latitude 30° or 35°. Most of the eastern coasts of China and of the United States are thus left in the more rigorous and more variable conditions of the north temperate zone. Through the middle of the trade-wind zone extends the subequatorial belt, with its migrating calms, rains, and monsoons. On the polar margins of the trade-wind zone lie the subtropical belts, of alternating trades and westerlies. The temperate zones, with the great irregularity of their weather phenomena and their marked seasonal changes, embrace the latitudes of the stormy westerly winds, having on the equatorward margins the subtropical belts, and being somewhat narrower than the classic temperate zones. Towards the poles there is no obvious limit to the temperate zones, for the prevailing westerlies extend beyond the polar circles. These circles may, however, serve fairly well as boundaries, because of their importance from the point of view of insolation. The polar zones in the wind classification, therefore, remain just as in the older scheme.

A compromise between the rigid division by latitude circles and the isothermal and wind classifications has been suggested by Woeikof,* who objects to limiting the torrid zone by the tropics on the ground that the high temperatures of that zone, as well as its characteristic winds, extend beyond these parallels. Latitude 30° would be a more natural boundary; but as the westerlies, which are characteristic of the temperate zones, prevail there in winter, latitude 25° is chosen as a compromise between 23½° and 30°. The polar zones are bounded by latitude 65°. When bounded by these several limits, the areas of the different zones are as follows:

Tropical Zone..................	417
Temperate Zones................	490
Polar Zones....................	93
	1,000

Summary and Conclusions.—Reviewing what has been said regarding the climatic zones, it would seem that, all things considered, a simple division by isotherms, such as that suggested by Supan (1896), is the best for general use. The early division by latitude circles, while it has the merits of great simplicity, and emphasizes the all-important element of sunshine, is too arbitrary, and hence does not accord sufficiently well with the facts of actual

* A. Woeikof. *Die Klimate der Erde*, Jena, 1887, Part 1, 327.

climate. Nevertheless, we should not discard the classic zones without recognizing that they have a real meaning in relation to solar climate. The grouping of the climatic zones according to wind systems has much to recommend it from a meteorological standpoint, but is not quite simple enough for general use. Its adoption involves an understanding of the great wind and calm belts of the world, and of the migration of these belts. The shifting of the boundaries of the torrid zone also brings in an element of uncertainty which is somewhat confusing, although, as a place in the subtropical belt really changes its climate with the seasonal change from westerlies to trades, and *vice versa*, it may reasonably be expected to change its zone. In other words, actual climatic conditions are recognized; and in any case this is a more reasonable plan than to limit the torrid zone by means of the tropics, which arbitrarily cut across the trade-wind belts and separate areas which are climatically the same. The temperature zones proposed by Supan (1879) and by Köppen, while useful in special studies of plant distribution, are too detailed for general adoption.

Whatever climatic zones we adopt, we should certainly abandon the word *temperate* altogether as the designation of the middle zone in each hemisphere, and substitute some such adjective as *intermediate* for it. The words *torrid* and *frigid* should likewise disappear, and be replaced by *tropical* or *equatorial*, and *polar*.

Necessary Subdivisions of the Zones.—However we may classify them, the climatic zones are far from being uniform in character throughout their whole extent. Hence, no brief, simple description of the climate of a zone can be given. For this reason suggestions have been made regarding subdivisions of the different zones. Thus, in the case of the classic north temperate zone it has been proposed to subdivide it into subtropical, temperate, and subarctic, but the question how to limit these subdivisions is difficult to settle. A more rational scheme is that which, in view of the great differences in the climatic relations of land and water, recognizes a first large subdivision of each zone into land and water areas. Then, as continental interiors differ from coasts, and as windward coasts have climates unlike those of leeward coasts, a further natural subdivision would separate these different areas. Finally, the control of altitude over climate is so marked that plateaux and mountains may well be set apart by themselves as separate climatic districts. If each of the zones, whether bounded by latitude circles, or by isotherms, or by wind systems, be con-

sidered under these general subdivisions, as close an approach to actual conditions of climate will be made as is possible in general description.* Obviously, however, when the larger zones are subdivided to such an extent as is here suggested, we are dealing with a classification of climates rather than with climatic zones.

* W. M. Davis, loc. cit.

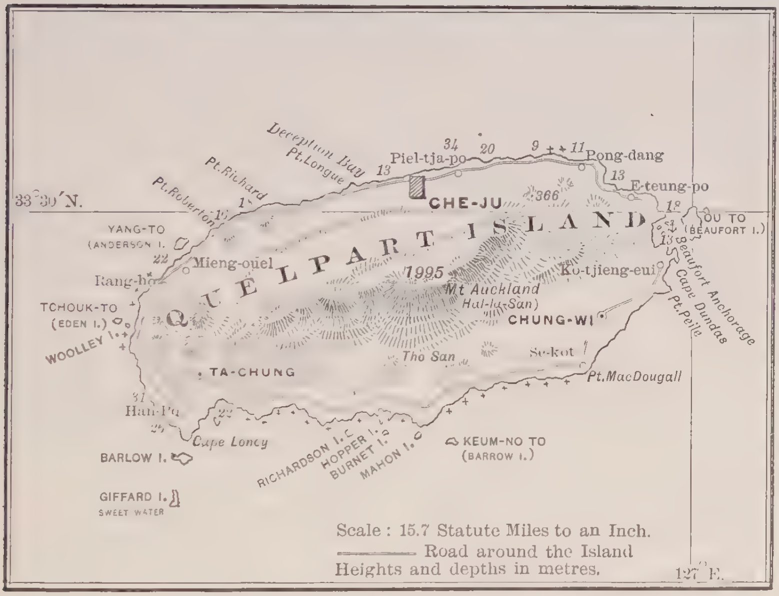
THE ISLAND OF QUELPART.

BY

H. B. HULBERT.

The island of Quelpart lies some fifty miles off the southern coast of the Korean mainland, but only thirty from the outer edge of the line of islands that fringe the coast of the peninsula. It is, in all probability, geologically one with the range of mountains which forms the backbone of Korea, and which finally sinks beneath the waters of the sea off its southern coast. It is by far the largest of the thousands of islands which form the Korean Archipelago, being forty miles long from east to west and twenty-two miles wide from north to south. The whole island is dominated by the central peak, Mt. Auckland, or, as the Koreans call it, Hal-la San, which means, "The Peak which Reaches toward the Milky Way." The entire island is apparently formed by the sloping sides of this mountain, with its many subsidiary spurs. Its origin is manifestly volcanic, for a close examination reveals the fact that there were two distinct streams of lava which flowed from the ancient crater—one toward the north and one toward the south-west. Where the northern stream of lava reached the sea it is twenty miles wide, while the southern one at the sea-shore is thirty miles wide. This prevalence of lava on certain well-defined portions of the island gives rise to two distinct kinds of soil. Where the lava prevails the land is stony and sterile, but where the lava is not found the soil is a rich black mould. Two-fifths of the island are of the former kind and three-fifths of the latter. Toward the east and west the land slopes away to the sea in a long, beautiful sweep, but on the north and south the slopes are steep, and there are many deep gorges.

The central peak of Hal-la San is about 6,550 feet high. At the very summit there is a small lake lying in what must be the crater of the extinct volcano. One of the main spurs of the mountain is called Chang-ol-ak, or "Long Point Peak." On the summit of this, also, there is a small pond. There are many lesser peaks, such as Vine Peak, Many Men Peak, Hog Peak, Deer Peak, Hat Peak, Water Peak, Sunset Farewell Peak, etc. The people say that if any one makes a noise of any kind near the lake at the summit fog and cloud will immediately form and enclose him. A certain well or spring on the mountain-side is called "Bushel Well," and it is said that if any one drinks the water he will be able to leap



NOTE.—The map is drawn from Asie 1:1,000,000, Flle 36 N. 126 E., published by the Service Géographique de l'Armée, Paris, 1898, corr. 1904.

one hundred paces at a step. They believe that this is why the Mongols were so strong when they held the island five centuries ago.

About the island there are a few smaller ones, notably "Cow Island," at the east. This is several miles long. The others are all along the southern coast, and are very small, about a dozen in all. On Cow Island there is a cave at tide-level into which half-a-dozen boats can go together. In the seventh and eighth moons no boats will enter it, because they say that it will anger the dragon which lives there, and it will cause great storms of rain and wind.

This superstition, doubtless, arose because these months are those in which typhoons occasionally sweep over the island.

Quelpart is of some importance as forming a link in the ethnological study which has for its object the determination of the origin of the Korean people. Tradition says that in the dawn of history the island was covered with a tangled forest and was without habitants. From a hole in the ground called Moheung, in Chin-san, on the north side of the main peak, three men emerged. They were Yang-eulla, Ko-eulla, and Pu-eulla, and it was in this order that they emerged. They lived by hunting, they dressed in skins, and they ate raw meat. One day three wooden chests floated in from the east or southeast covered with brown clay. A man mysteriously appeared, clothed in brown, with a red belt. He opened the chests before the wondering eyes of the three inhabitants of the island and disclosed three women clothed in blue (symbol of the East), three calves, three colts, three dogs, three pigs, a quantity of seeds, and some stone dishes. The mysterious man said, "I am an envoy from Japan. Our king had three daughters, and as you have no wives he has sent them to you at my hand. Take them and make a great kingdom here." Then he mounted a cloud and rode away. Each of the men took his wife and other chattels and settled down. Each of them built a town, enclosing as much land as one could shoot across with a bow. It would seem that as time went on the Ko family obtained the ascendency, for tradition says that after fourteen generations had passed three brothers named Ko-hu, Ko-ch'ŭng, and a third, whose name is not given, crossed by boat to the mainland and visited the capital of the kingdom of Kye-rim (which name was changed to Sil-la later).

The astrologers of Kye-rim told the King that the "Guest Star" had appeared in the southern heavens, and that visitors might be expected from that direction soon. True to their word, the three Ko brothers landed at a port called T'am-jin (now Kang-jin) and came up to the capital. They were hospitably received, and the King conferred upon them the titles Sŭng-ju, or "Lord of the Star," Wang-ja, or "King's Son," and "To-nă, or "The One who is in Town." For many centuries these continued to be the names of high official grades on the island of Quelpart. The King also named their island T'am-na. Some say it was so named because the three brothers landed at T'am-jin. Another rendering of the name was T'a-na. In these words the syllable *na* was the ancient word meaning "kingdom." The date of these events is not given; but it must have been very early, for we read that in the middle of

the fifth century of our era the kingdom of T'am-na ceased paying tribute to Păk-che, which was a powerful kingdom in southwestern Korea, and contemporaneous with Kye-rim or Sil-la. The King of Păk-che sent an army to enforce the tribute, but the King of T'am-na, hearing that this was determined upon, sent in haste and renewed his allegiance. When Păk-che fell before the combined arms of Sil-la and China, and Sil-la obtained control of practically the whole of the peninsula, the King of T'am-na, named Chwa-pyŭng To-dong Eum-yul, came and did obeisance to the King of Sil-la. Sil-la was overthrown, and the peninsula passed into the the hands of the Koryu dynasty in 918 A.D., and the Crown Prince of T'am-na, named Mallo, came to the capital and swore fealty to the new king. The latter conferred upon him the title of Sŭng-ju Wang-ja. About the year 1150 the island of Quelpart was reduced to the status of a mere prefecture of Koryu. The records say that the people of the island were very unruly. The Mongols invaded Koryu in 1231, and immediately became masters of the situation. For more than a century Korea was at their mercy. But small mercy they showed. They established on the island of Quelpart a horse-breeding station, in order to recruit their cavalry, and even after the Mongol power had waned and fallen in China, the half-savage Mongol horsemen on Quelpart continued to defy the armies of Koryu. This was because Koryu had sunk to a state of utter weakness through the baseness and effeminacy of her rulers, and any one with a little courage and force could work his will wherever he wished. At last, however, they were successfully attacked; but they appealed to the Mongol Emperor, and he sent to Koryu suggesting that when he was obliged to leave Peking he would make his asylum on Quelpart. This frightened the King, and he hastened to say that the expedition to Quelpart was not against the Mongols but to catch some Japanese freebooters. In 1368 the Mongol dynasty fell, and the Mings came to the throne of China. The Mongol horsemen, however, held their own as yet on Quelpart. Five years later the Ming Emperor sent to the King of Koryu demanding 2,000 of the celebrated horses that were bred on Quelpart. In fear and trembling the King sent to the island for them; but the Mongols said, "We are Mongols. Why should we give horses for our enemies?" They sent 300 of the animals, however. This by no means satisfied the Emperor, and he demanded the full 2,000. The King had to proceed to extremities, and an expedition of 25,000 men, in 300 boats, was sent to the island. Part of the fleet was wrecked by a storm, but the rest landed and attacked the

Mongols, who were 3,000 strong. The latter were driven back, and at last beaten, and had to surrender. Their leader, T'ap-chi, was cut in two at the waist, and many others committed suicide. A large number who refused to submit were cut down. This ended the rule of the Mongols on the island for all time.

That Quelpart has been dominated by volcanic influences has, as we have shown, been fully demonstrated. But we do not have to depend simply on a geological examination to prove this, though, of course, there could be no better proof. The following account, taken from the great Korean geographical gazetteer called the Yö-ji Seung-nam, is evidence of volcanic action even within the last few centuries. In the fifth year of King Mok-chong of Koryu (1003 A.D.) a mountain suddenly rose from the water. There were four holes, and from them poured "floods of red water," which soon turned to stone. Five years later another wonder of the same kind occurred, and the king sent a celebrated scholar to examine it. The people reported to him that when the mountain came up there was a dense cloud and fog, accompanied with earthquakes and thunderings. After four days it was all over; but there stood the new mountain, over a hundred feet high and twelve miles around. There was no wood nor grass on it. It was constantly covered with a pall of smoke, but when the wind blew the smoke away from a portion of the mountain it was seen to be of a dirty yellow colour. No one can fail to recognize in this a distinct volcanic action.

The natives say that snow lies on the summits of the mountain until into June; but the climate of the general level of the island is so warm that certain vegetables grow all winter long on the southern side. In February the grass is sometimes four inches high and flowers are in bloom. One observer says:

> All the mountains as well as the slopes on the east are covered with a thick growth of oak, in which deer, wild hogs, hares, and other animals abound. There are no tigers nor bears. The hills that have no trees are covered with the peculiar Korean turf which makes such an exquisite lawn. This is even prettier on Quelpart than on the mainland, and one frequently comes across natural lawns, four or five hundred yards square, covered with this velvety turf, without a single weed visible. There are no good harbours on the coast of Quelpart, and this lack of shelter, together with the prevalence of high winds, makes navigation very difficult.

Very few foreigners have ever visited the island, and of these ~~few~~ hardly any made a careful examination of it; but in the spring of 1900 the Korea agent of the British and Foreign Bible Society, in company with another foreigner, made a complete tour of the island, and made a very careful examination. Their account is particularly instructive; and as it appeared only in a small local periodical, we shall quote extensively from it as embodying the fullest information obtainable at the present time.

These careful observers say that there is a surprising absence of springs and streams, for in making their trip around the coast they crossed only two streams; and this, too, just after heavy rains. There are good springs in the one town of Che-ju, and it is more than likely that their being there is what determined the situation of the island capital. In the other towns there are none, and the people have to use rain-water, which they store in artificial ponds. Where the water from the melting snow goes is a mystery.

The island is divided into three prefectures—a northern, southwestern, and southeastern. Che-ju is the northern one, with the town of the same name as its administrative centre. This is also the seat of the Moksa (shepherd) or Governor of the whole island. It is a walled town, and contains about 1,200 houses. This would mean a population, perhaps, of about 6,000; but this is a minimum estimate, for it is more than likely that each house has more than five inmates. The southwest prefecture is Tă-chŭng, with a town of about 2,000 people in its centre. This town is also walled. In the southeast is the prefecture and town of Chung-wi. The town has 300 houses, with at least 1,500 people. It is stated that there are upwards of one hundred villages on the entire island, and that the population mounts up to the respectable figure of 100,000. This is the native estimate, and cannot be relied upon for accuracy. The three walled towns mentioned lie in the shape of an isosceles triangle, with Che-ju for the apex and the line from Tă-chŭng to Chung-wi for its base. It is about twenty-four miles from Che-ju to either of the other two, and they in turn lie thirty-nine miles apart. Ever since the beginning of the present dynasty the island has formed, from an administrative standpoint, a part of the southwestern province of Chul-la on the mainland of the peninsula, except for a short period just after the Japan–China war, when it was denominated a separate province.

The travellers above mentioned state that the villages lie either along the coast, where the gathering of sea-products forms such a large part of the industry of the people, or near the foot of the mountains, where fuel is plentiful and the people live by agriculture and the rearing of stock. The space between the shore and the foothills is largely unpopulated, and wide stretches of rich soil lie permanently fallow. This may seem a very curious condition of things; but we believe it is not hard to explain. The difficulty of obtaining water makes it more convenient to live near the foot of the mountains, for there the melting snows provide this necessity;

and, besides this, we find that the people who raise cattle keep them on the plains in winter, but drive them into the mountains in summer, so that they may not destroy the fields of grain. It is most natural, then, that they should place their houses between the fields and the summer grazing lands of the cattle, both for their own convenience and the safety of their crops. Those that live on the shore are compelled to do so because they follow the sea so largely. On the other hand, this peculiar adjustment of the population may represent some very ancient social demarcation, or even difference of race, which still awaits investigation. The early traditions of the mainland say that in most ancient times there were two kinds of people—those living along the coast and those living among the mountains. The wide stretch of land lying between these two, in Quelpart, is considered common property, and any one who wishes can cultivate it at pleasure, except in the immediate vicinity of the villages.

Millet is the most important cereal raised, and it forms the staple article of diet. Rice is a luxury that only officials and the wealthy few can afford, and it is mostly brought by boat from the mainland. Moderate quantities of upland rice, sorghum, beans, barley, wheat, potatoes, tobacco, buckwheat, yams, turnips, and cabbage are raised. Some ten varieties of medicinal plants are exported, and a little fruit is grown, mostly oranges, pomeloes, and peaches. The people do not eat much meat, but beef, horse-flesh, pork, dog-meat, fish, and pearl oysters are consumed in moderate amount. We are told that crabs, common oysters and the various kinds of clams that are so plentiful along the shore of the mainland are not found near Quelpart. The sea-bottom in the vicinity of Quelpart is too rocky to admit of fishing with nets, and it is all done with hook and line. Much of the fishing is done from a curious sort of raft made by binding together ten short logs of wood and erecting a platform upon them. This is propelled by a scull. The most curious thing about this craft is its name. It is called the "bamboo boat," though the bamboo does not enter into its construction in any way. In this connection it is worthy of note that some of the aboriginal tribes of Formosa use a raft of the very same kind which *is* made of bamboo. The question is whether this name in Quelpart is not the survival of a name brought from the south and continued even after the word had lost its real significance. This is one of many little indications which point to the southern origin of these people.

Pearl oysters and various kinds of sea-weed are exported to the

mainland in considerable quantities, or were until the Japanese encroached upon the fishing grounds and swept the coast clean of pearl oysters, after which the sea-weed alone was exported. These pearl oysters are very large, and are not bivalves, but cling to the rock with a single shell. It is from these that the Koreans get the mother-o'-pearl with which to inlay their cabinets. The meat of this shell-fish is considered a great delicacy. Only the muscular part is used. This is cleaned and dried, in which process it turns to a rich dull red colour. It is sold in Seoul strung on sticks, each stick holding ten.

Of sea-weeds there are several different varieties. Some of them are used as fertilizers, others as food, and others still are sold to the Japanese for the manufacture of carbonate of soda. The coarser kinds that grow on the surface near the shore are the ones used as fertilizers, but the delicate edible ones grow further out at the bottom. It is a most curious fact that all the diving for pearl oysters or sea-weed is done by the women. From the earliest times the women have monopolized this work, which until within the last ten years they always did in a nude state. There was a strict law that during the hours of fishing no man should go within sight of the fishing-grounds. But when the Japanese began to encroach upon these preserves they paid no attention to this law, and consequently the women were driven out of the business. The people of Quelpart appealed to the central government to stop the utterly lawless encroachments of the Japanese, but without the least success. As it was a matter of life and death with thousands of the people of Quelpart, the women gradually learned to make use of a sort of bathing costume, and so resumed their occupation. Armed with a sort of sickle, and carrying a bag, to which an empty gourd is attached as a float, they swim out a quarter or half a mile from shore, leave the bag floating on the surface and dive ten, twenty, or even thirty feet to the bottom. They cut the sea-weed with the sickle or tear off the pearl oyster, and then rise to the surface and deposit their booty in the floating bag. It takes from twenty to forty minutes to fill the bag, but they do not return to shore until it is done. As may easily be imagined, these women are of splendid physique, and their courage and endurance are marvelous, for the season begins as early as February. Of late years the Japanese have come with diving apparatus and stolen most of the pearl oysters.

This brings up the whole question of woman's status in Quelpart. They do by far the major part of the work, even to bullock-driving. Nowhere else in all Korea are women allowed to carry water, but here they do it all, and often-times it has to be brought a great distance. They use for this purpose a basket swung from the shoulders, and in this basket they carry earthen pitchers to hold the water. This startling variation from the universal custom indicates some ancient difference in habit, and at least proves that Quelpart has not kept up with the mainland in the slow growth of civilization.

Not only do the women do the most of the work, but they exceed the men in number. On the streets one sees three women to one man. As a rule these women are much more robust and handsome than those on the mainland. They compare much more favorably with the men in every way.

Here we find another striking coincidence, for those who are conversant with the aboriginal tribes of Formosa say that the same is true of them. The women are much superior to the men in physique and in general appearance. A member of the Imperial Chinese Customs Service once related to the writer how he made a journey into the very fastnesses of the Formosan mountains and visited the homes of the dreaded head-hunters. He was blindfolded and led all the way by a bodyguard of women. He declared that the younger women of that tribe were among the handsomest women in the world.

The reason why he was led by women was because in this way he could pass through other hostile tribes unmolested, since no one

would attack women. All peaceful expeditions of the kind were so led.

But in spite of the energy of the Quelpart dames the people are very poor. Their food, their houses, their clothes, are all far inferior to those of the dwellers upon the mainland. Dog-skins are extensively used in making clothing. Caps, overcoats, leggings, and socks are frequently made of this skin, with the hair on the outside. Such garments are handed down from father to son, and time adds to their flavour. Ordinarily the people use imported cotton cloth, which is made more durable by dipping into the juice of the wild persimmon. This imparts a dirty brown colour, which obviates the necessity of frequent washings. Many of the men wear broad-brimmed hats of coarse felt like those of the chair-coolies of Seoul, but much larger. They measure about two feet from brim to brim.

The Quelpartian is differentiated from other Koreans in various ways. The ordinary Korean has adopted a form of *kang* from the Chinese. It consists of making flues beneath the floor for heating the room. This has never been adopted by the people of Quelpart. They dig a hole in the ground and build a fire in it, and about this fire they eat and sleep and live. It should be added that in the large towns the official and wealthy classes have followed largely the customs of the mainland in most respects. But we are dealing with the common people, and not with exceptional cases. For the most part, the houses are thatched; and on account of the high winds that prevail, these thatches are held down with a mesh of thick straw-rope net.

The trade of the island is inconsiderable. A few shops in the main towns supply what cotton-shirting is necessary, but the markets that are held in all large towns on the mainland every five days are not known here. A little trade in foreign needles, thread, and nails is done.

The exports from the island consist of seaweed, medicinal plants, cosmetic oil, horse and cowhides, horses and cattle. The oil is pressed from the seeds of the *Datura Stramonium*, which is an evergreen growing luxuriantly all over the southern portion of the island. It blooms in February and puts forth beautiful crimson flowers. It is rare on the mainland.

It is a singular thingthat an island like this should have been the breeding-place for the hardy Korean pony. Outside of Korea, such horses are found nowhere in Eastern Asia, excepting in the Malay Peninsula. They have nothing in common with the Manchu or Mongol pony. The theory of a southern origin would help to explain how an outlying island like this could become the breeding-place of these animals. In winter the animals, both horses and

cattle, wander over the island at will; but in summer they are driven into the hills, to save the fields from being ruined. The many stone walls about the fields on the upper levels are made partly to get rid of the stones and partly to keep out the live stock. No small part of these beasts belong to the Government, and an official is especially appointed to look after them; but we imagine that in these degenerate days the custom is honoured more in the breach than in the observance. The laxness of the Government is reflected in the people, who are not at all scrupulous as to the *meum* and *teum* in horse-flesh.

The religious ideas of the Quelpartians are very crude. At each of the three prefectural towns there is, of course, the regulation Confucian shrine, and near the gates are placed numbers of idols cut out of lava, but, as a rule, the people believe in all sorts of spirits and goblins, and fetich-worship satisfies best their religious feelings. Buddhism once prevailed here, as elsewhere in Korea, but a century or so ago a zealous Confucian Governor drove out all the Buddhist monks and destroyed the monasteries. To-day the Roman Catholics have a considerable following on the island, and two years ago a serious affray occurred between them and the unbelievers. The real cause of this has never been satisfactorily explained, but it is certain that the fault was not all on either side. They assume mourning for only 100 days after the death of a parent, though the usual custom of Korea is to keep it on for three years. In the first and second moons they assemble at the spirit shrines and erect twelve poles, on which they hang masks like horses' faces and dress them in silk. This has something to do, evidently, with the horse-breeding proclivities of the people. There are said to be many snakes and centipedes on Quelpart. If a person meets a gray snake he will not harm it, for he considers it to be superhuman. On the fifteenth of the eighth moon they have a great festival, at which they have a monster tug-of-war, the men pulling at one end and the women and children at the other.

There are few sights worth seeing on Quelpart. On the west side there is a cliff called Chă-am or "Treasure Cliff." It is shaped like a house with a rounded roof, and beneath it there is a cave. The "treasure" consists of a substance called "the milk of the stone-drum"—whatever that means. Near Tă-chung a pinnacle of rock rises to a height of eight hundred feet, and in its southern face, three hundred feet up, there is a cave, the view from which is said to be magnificent. The cave was once used as a Buddhist monastery. On the southern side of the island there are two curi-

ous waterfalls, some ten miles apart. They are almost exactly alike, and are formed by streams falling into circular holes in the rock. These holes are thirty feet wide by forty deep. Near the top of Old Hal-la there stands a row of statuesque rocks that the Koreans call "The Five Hundred Heroes." It has been said that the spot where the three mythical founders of T'am-na arose from the ground is still shown, but the foreign gentlemen already quoted could find nothing about it on the island. But the great geographical work already mentioned says specifically that the place lies two *li* south of the town of Che-ju, and, if it were looked for carefully, there is little doubt that some trace of the story could be found in the vicinity.

Just east of this same town there is a flat strip of land between the sea and the abutting cliffs which is called the Koryŭng Plain. In the days of the Tang dynasty in China (618–905) a Chinese boat was wrecked at this place. It was loaded with precious objects, and it is said that the waves washed up many of these. Centuries after the farmers would occasionally plough up one of them.

The stories told about Quelpart, its mountains and hills, are very numerous and interesting from the standpoint of folk-lore. We can give here only a few as samples of their general style. The spirit of Hal-la Mountain had a younger brother who assumed human shape. When he died the people built a shrine in his honour and called it "Broad Earth Hall." But a man named Ho-jung, of the Song Kingdom in China, came and desecrated it. The spirit took the form of a hawk and perched upon the mast of the bad man's boat and a gale from the north shattered and wrecked it.

Near Chung-wi—so legend says—there once lived an immense serpent, to which an annual offering of a young maiden had to be made or else rain would not fall, horses and cattle would die, and sickness would prevail among the people. A certain gentleman whose daughter's turn had come rebelled against this ophidian imposition, and on the appointed day, instead of sending his daughter, he went himself, armed with a sharp axe. The monster protruded its head from its lair, expecting to find a succulent maiden to eat, but received a new sensation in the shape of a sharp blow, which severed its head. This apparently rid the island of the pest. But the end was not yet. The man cut the serpent into small pieces and enclosed them securely in a large sauerkraut jar. At first the people rejoiced, but soon they found that the serpent came to them every night in their dreams and threatened them with a variety of horrors in case they did not let him out of pickle. They finally did

so, and each piece became a separate and entire snake. But even as his body had been divided, so his power was dissipated, and no more maidens had to be served up for his delectation. To make assurance doubly sure, the people still sacrifice a pig yearly on the spot where he lived and serve it up to his spirit with rice and wine.

Another story relates how the Buddhist monks used to assemble at the foot of Hal-la on a certain day each year and choose one of their number by lot to enjoy the experience of translation. The chosen man would ascend to a certain lofty ledge of rock and immediately a white cloud would roll down the mountain-side, envelop him and then drift away, leaving the rock tenantless. He had manifestly been translated to the habitations of the gods. A certain Governor was sceptical, and proposed to accompany this novel expedition once and see the wonder with his own eyes. Arriving at the foot of the mountain about dark, they camped for the night, sleeping within a ring of fire for fear of the serpents which infested the place. The Governor insisted that they choose the fortunate man before they retired. Then they all lay down and went to sleep—all but the Governor, who sat smoking his long pipe. When they were all wrapped in slumber he went and lay down beside the chosen man, whose approaching felicity by no means interfered with his night's rest, and began puffing tobacco smoke into his clothes until they were covered with little brown spots of nicotine. Morning came and the monks all stood in an ecstasy of expectation, while their more fortunate comrade climbed the steep path. He mounted the ledge, and almost instantly the white cloud shot down from a cleft in the rock far above. It hid him from view for a moment, and then drifted away, showing the ledge bare as the day it was created. A murmur of awe went through the company, and they all fell on their knees in awe and adoration—except the Governor, who bade them wait a moment and keep their eyes fixed on the cleft of the rock from which the cloud had come. A moment later the figure of a man was seen leaping down the mountain's side, and soon their comrade rushed into their midst and fell exhausted. When he revived he told them that the moment he reached the ledge he saw the head of a monster serpent protrude from the cleft of rock and blow a cloud of vapour down upon him. An instant more and the coils of the serpent were around him, and he was swiftly raised to its lair. The serpent dropped him upon the floor of the cave, which was strewn with dead men's bones; but though it seemed desirous of devouring him, it would

throw its head this way and that as if in doubt about something. He slowly backed out of the cave and took to his heels, with the result related. The Governor smiled and pointed to the spots on his garments. There were no more attempts at apotheosis.

EXPEDITION TO HUDSON BAY AND NORTHWARD.

The preliminary report of Dr. A. P. Low, of the Canadian Geological Survey, on the expedition to Hudson Bay and northward in 1903–04, which he commanded, is printed in the annual *Report* of the Department of Marine and Fisheries for 1904. It contains some new facts of interest relating to Hudson Bay, on the western coast of which the party spent the winter.

The *Neptune*, the largest and best of the sealing steamers of the Newfoundland fleet, was chartered for the voyage, fitted out at Halifax, and left that port for the North on August 23, 1903, with officers, crew, and passengers, numbering in all 42 persons. An Eskimo interpreter was picked up at Port Burwell on the Labrador coast, and the vessel crossed Hudson Strait to Cumberland Gulf to visit the settlement of Blacklead, a whaling station on the island of that name near the west side of the Gulf. The Report says:

> The settlement, consisting of some dozen small buildings, is situated on a high, barren rocky island, about five miles from the mainland (of Baffin Land). There is a fairly safe anchorage protected by reefs, in a small bay, at the southeast end. The settlement consists of a small whaling and trading post, belonging to Noble Bros., of Dundee, Scotland: and is the headquarters of the Church Mission Society on Cumberland Gulf.
>
> The whale fishery is carried on at Cumberland Gulf in whale boats manned by Eskimos, who are employed by the whalers for that purpose, at Blacklead and Kikkerton stations. Each boat has a crew of five natives. The fishery starts about the 1st of October, and continues until the Gulf freezes solid—generally in December. It is renewed again as soon as the ice begins to move; which is usually in February, or the beginning of March. The fishery is not very profitable, as whales are not taken every year. Happily for the natives, two whales were captured in the spring of 1903; and later 3,000 seals were killed; this has put new life into the trade, and has prevented the abandonment of the station, which had been seriously contemplated. There are about 450 persons, of Eskimo blood, living about Cumberland Gulf; and all are more or less dependent on the whaling stations for a living; so, were the stations abandoned, there would be great hardships among them; and a number would probably perish if outside help were not afforded.

All the able-bodied males were away hunting caribou on the mainland of Baffin Land. They go in their boats far inland to the neighbourhood of Nettilling Lake, where the deer are very numerous. A visit was also made to Kikkerton, the other whaling station in the Gulf. It is about 10 miles from the north shore of the Gulf, the cluster of small buildings nestled at the foot of a rocky hill on an island. Two rivers on the north side of the Gulf and one at its

head are well stocked with Arctic salmon, and a successful fishery could be developed there.

Returning south, the *Neptune* entered Hudson Strait and followed the north shore. Passing Saddleback Islands, they were found to be double the number marked on the chart. The southeast winds that had prevailed all summer had driven icebergs into the Strait, and over fifty were counted along the north shore.

Nearing Hudson Bay the *Neptune* crossed to the south side of the Strait and near the west end of Charles Island a great many walrus were observed, The walrus were hunted to obtain a supply of dog food, and it proved very exciting sport. Seven were captured, and two polar bears were killed.

The *Neptune* crossed Hudson Bay to the mouth of Chesterfield Inlet, where eight tents of Eskimos were found. Another encampment was found about 120 miles up Chesterfield Inlet, which was ascended in a launch. The men were away hunting, but over 70 deer skins and 400 pounds of meat were purchased from the women. There had been a great slaughter of deer at this camp in August and hundreds of half cleaned skeletons were lying about. At this point the launch turned back to Hudson Bay. The *Neptune* in the voyage to Chesterfield Inlet grounded twice out of sight of land to the north of the Inlet, and several times got into very shallow water. This shows the danger of this uncharted coast.

The party wintered at Cape Fullerton on the west side of Hudson Bay, northeast of Chesterfield Inlet. The harbour froze over on October 16. The short days of winter months passed quickly. Sufficient work was found to keep all busy during the daylight, and the monotony of the long evenings was relieved by games, readings, a weekly lecture on Wednesday, and a dance on Thursday. Another weekly dance was given on board the American whaler *Era*, which was wintering in the neighbourhood.

Early in April Mr. Caldwell explored the country between Cape Fullerton and Wager Inlet to the northeast, and made an excellent sketch of the shore-line. He was absent nearly two months. On June 15, Dr. Low and Dr. Borden, with two of the crew and two natives, left the ship with two whaleboats for a trip to Southampton Island, in the north, the largest island of Hudson Bay. It is observed that Dr. Low does not call it North Southampton Island, as has heretofore been done on many charts to distinguish it from South Southampton Island, separated from the larger island by Fisher Strait. As the name "Coats" is now commonly applied to the smaller of these islands, the Canadians no longer use the

prefix "North" with the larger island. About fifty miles of the western coast-line of Southampton Island were surveyed, and formal possession was taken of it by hoisting the Dominion flag.

On July 18, 1904, the *Neptune* broke out of the harbour ice and started for Hudson Strait. East of Coats Island much heavy ice in large sheets was encountered, and the ship was forced far to the southward. When she finally got into Hudson Strait it appeared blocked with ice, and the vessel was beset for nearly two days, drifting to the eastward. She was finally able to force her way into open water. No serious encounter with the pack was met later, and on July 25th the party reached the *Erik* at Port Burwell with supplies from Halifax.

The coal and provisions were taken on board, and on August 2 the *Neptune* started on her northern cruise to Cape Sabine, at Smith Sound. The passage of Melville Bay was made in very dirty weather, with fog and heavy rain, but fortunately little ice until within a few miles of Cape York. The progress to the north was not impeded, however, and on August 10 the vessel entered Etah Bay, looking for the Arctic highlanders, but none were there. The party crossed to Cape Sabine, passing very heavy Arctic ice, which had come down the Smith Sound channels, and took formal possession of Ellesmere Island and adjacent islands for the Dominion in the name of the King.

No time was then lost in getting southward away from the heavy ice that was pouring steadily past Cape Sabine. The flag was again hoisted over North Devon and North Somerset. In Ponds Inlet an encampment of the western Eskimos was found in thirteen tents, and up the Inlet the Dundee whalers *Diana* and *Eclipse* were met. Only five small Dundee whalers were at work last year. They had caught nine whales up to that time, but it was learned later that the fall fishery along the east coast of Baffin Island was entirely unsuccessful. The *Neptune* reached Port Burwell again September 4, and arrived at Halifax on October 11, after an absence of a year and fifty-one days, during which she had steamed over 10,000 miles.

The year's work included 1,175 miles of log and compass surveys of coast-line, previously unsurveyed; 91 miles of chain and micrometer surveys of the harbour and environment of Cape Fullerton; many astronomical observations for the position of Fullerton; 433 soundings through six feet of ice in the harbour and approach to Fullerton; 610 miles of geological investigation on the west coast of Hudson Bay, from the head of Chesterfield Inlet to the head of Wager Inlet; 70 miles of track survey and geological

examination on the west shore of Southampton Island, and 95 miles of boat survey (geological) of the east side of Ungava Bay; total surveys, 2,041 miles.

Large collections of rocks and fossils were made, anthropological studies were carried on, and large collections of flora and fauna were obtained. The average temperatures at the winter camp in Hudson Bay were: December, $-8.1°$; January, $-22.4°$; February, $-27.8°$; and March, -20.6.

THE USEFUL PLANTS OF GUAM.

The Government press has issued (Smithsonian Institution) a volume of 416 pages on this subject. It forms Volume IX of "Contributions from the United States National Herbarium," and is a notable accession to our knowledge of this little island, the result of fortunate circumstances making it possible to secure a careful botanical study of it. The author is Mr. W. E. Safford, assistant botanist in the Department of Agriculture. For several years, when a lieutenant in the U. S. Navy, he had an opportunity to study the plants of Upolu and Tutuila, of the Samoan group, and of Oahu, of the Hawaiian group. He was Assistant Governor of Guam in the year ending August, 1900, and the book is an elaboration of notes and observations made in that year, and during the earlier years of his studies among the Pacific islands.

While the title is "The Useful Plants of Guam," it includes references to every plant known to occur there, with particular attention to those which have been described as species new to science. The descriptive catalogue of plants covers 234 pages. The principal plants used for food—fibre, oil, starch, sugar, and forage in the tropical islands acquired by this country—are discussed and their common names are given, not only for Guam, but also for the Philippine Islands, Samoa, Hawaii, and Porto Rico. The methods of cultivating them are given in detail, and the preparation of their derivative products, such as arrow root, coprá, and cacao.

Mr. Safford also studied the archives of Guam, and his account of the discovery, early history, and explorations of the island, with its climate, ethnology, and economic conditions, affords the most comprehensive and authentic picture of Guam thus far published. There are 70 illustrations, including a map of Guam, and half-tone

pictures of many plants, forests, typical native dwellings, Government buildings, and settlements.

The author has much to say of the dispersal of plants by ocean currents. The east coast of Guam is the windward side, and along its sandy beaches is a line of drift, just above high-water mark, rich in seeds, fruit, and drift-wood, brought by the great ocean current which sweeps across the Pacific from east to west. Many of these seeds and logs are covered with teredo borings or with barnacles, but often they are fresh and little worn by the erosion of waves and sand. Many seeds are dead, but some are alive and capable of germination.

Not all the species have gained a foothold on the island. The seeds of plants, for example, which grow in muddy estuaries or mangrove swamps, cannot establish themselves on a clear sandy beach. Nuts of the nipa palm are washed ashore in perfect condition, but can grow only near the mouths of streams where the water is brackish. Germinating fruits of *Rhizophora* and *Bruguiera* come ashore only to die. Many cocoanuts come in the drift, but on the east coast, where they are washed ashore, there is not a single cocoa grove, while on the west or leeward side, where the groves are planted, they thrive near the sea. It seems probable that cocoanuts grow in Guam only where they have been planted, except in cases where nuts that have fallen from local trees have taken root.

Many seeds are sufficiently buoyant to float on the surface of the drift. Sea-beans, for example, inclose an air-space between their cotyledons ; others have kernels which do not fill their shells, but leave a space for air to keep them afloat; others have fibrous husks composed of light tissue; others have woody or coat-like shells of low specific gravity, and still others have a separate air-chamber. Mr. Safford mentions a large number of these fruits and seeds that are brought ashore.

With Schimper as a guide and the benefit of the experiments of Guppy and of Treub, a student on the island of Guam would find abundance of material and a most favorable opportunity for studying the seeds of the drift in the places where they have been deposited by the great trans-Pacific current, and where they could be observed in the process of germinating under absolutely natural conditions.

There are no indigenous quadrupeds. The only mammals in early times were two species of bats, the fruit-eating "flying fox" and a small insectivorous species, *Emballonura semicaudata*, Peale. The Norway brown rat was probably introduced by ships. It is very abundant, and a great pest, especially in the maize and cacao plantations. The common mouse, also introduced, causes little harm. An introduced deer, *Cervus mariannus* Desm., overruns the

island and causes great damage to crops. Its flesh has a fine venison flavour, and is a food staple of the natives. Buffalo, cattle, horses, mules, pigs, goats, cats, and dogs have been introduced. The buffalo are used for draught purposes, as in the Philippines. Horses do not multiply. Colts are born, but do not thrive.

The author describes the land-birds, the most beautiful being the rose-crowned fruit-dove, with plumage of green, yellow, and orange, and its head capped with rose purple. There are few reptiles. The natives do not engage so much in fishing as formerly, though they catch in nets and traps small fish swimming in schools near the beach.

The writer tells of the terrible hurricanes that visit the island at any season of the year, destroying native houses and crops, and stripping most of the vegetation of its foliage. The destruction in 1900 by two hurricanes caused a dearth of food, and the Government expended nearly $10,000 for the relief of the natives. Among the most serious results is the stripping of cocoa trees of their leaves. The inflorescence is formed in the axils of the older leaves, and if these are injured the flower-buds shrivel and the tree fails to produce. For this reason, in 1901, the year after the hurricanes, not an ounce of coprá, which is practically the only export of the island, was produced in Guam.

Many of the typhoons which sweep the Philippines apparently have their origin in the neighbourhood of the Marianne Islands, of which Guam is the most southern member. Dr. Abbe suggests, in a recent report, that a station be established on Guam for meteorological observations, to be connected by telegraph with Manila. This should be of great benefit to vessels in Philippine waters, giving warning of approaching high winds and indicating the kind of weather to be expected.

THE YERBA MATE.

This picture of the yerba mate tree is taken from *Globus* (No. 14, 1905), in which the mate and timber industries of the Misiones Territory of Argentina are described. Doubtless many North Americans have never seen a picture of the mate tree (*Ilex Paraguayensis*), the leaves of which, used like tea leaves to make an infusion for a beverage, make one of the important commercial articles of the southern part of South America. Thousands of per-

sons in southeastern Brazil, Paraguay, and the Misiones Territory earn their living by collecting, treating, and marketing this leaf.

The yerba mate is described by Father Vogt, the writer of the article in *Globus*, as an evergreen growing to a height of 20 to 35

YERBA MATE.

feet. It thrives on the banks of rivers and brooks and in the damp and shady parts of the forests in sub-tropical temperatures. It is in bloom in October and November. About the end of

January its fruit matures, each containing four little seeds, like peppercorns, with hulls so thick that the seed, in popular opinion at least, never germinates unless it first passes through the stomachs of small birds that feed on it.

The *Daily Consular Reports* (No. 2247) contain several articles on the yerba mate from our consuls, one of whom declares that the seed may be germinated by soaking it in warm water for four days. The fact remains, however, that the plant has not heen cultivated to any extent. The small oval leaves are collected from the wild plant, which is regarded as so important that the Governments concerned have adopted stringent regulations for its protection. A severe penalty is prescribed for gathering the leaf when the tree is flowering. The harvesters, with ordinary machetes, lop off the outside foliage and twigs, but the top centre of the tree must not be touched. If it were cut off the tree would die. If a man fells a tree to facilitate harvesting he is punished. After the crop is gathered from a tree four years elapse before it is ready for another harvest.

Yerba mate may be prepared for market in thirty-six hours. The leaves are slightly scorched by being passed rapidly through a fire, and then the twigs are suspended in sheds open at the sides, where they are exposed for fifteen or twenty hours to a fire of scented wood, after which the leaves and twigs are ground and the whole is ready for market. Ten men in two days often prepare three or four tons.

The infusion of yerba mate is now more or less used by 18,000,000 people in Brazil, Paraguay, Uruguay, Argentina, Chile, Peru, and Bolivia, the annual consumption never falling below 55,000 tons. All efforts to introduce it into Europe have practically failed. Mr. F. Seeber, in his book "Great Argentina" (1904), writes:

> This beverage is consumed by country people in most of the South American Republics. They attribute certain tonic properties to it and prefer it to coffee. Argentina, which produces yerba mate of inferior quality in the Missions Territory, imports the article from Brazil and Paraguay to the amount of $3,200,000 and $800,000, respectively, making together $4,000,000, while the imports of coffee and tea amount to only $750,000 and $450,000 respectively.

According to the *Revue Scientifique de Paris*, Brazil exports 30,000 and Paraguay 5,000 tons per annum. "Its virtues," says M. Conti, "as a mild stimulant are well known, as well as its nutritious qualities." In parts of South America it forms nearly the whole sustenance of field laborers in outdoor pursuits. Women often take 10 or 12 cups daily. All authors from the Jesuits down to Parody say that it can sustain the system during long hours of labor. The consumption has grown fivefold since 1840, although in the city of Buenos Aires it is almost out of fashion. Mr. Parody says that it may well supplant coffee, being also much cheaper, selling at 8 or 10 cents per pound.

Foreign workmen soon become habituated to the use of yerba mate and even ask for it in place of coffee. Argentina is experimenting with the tree in the botanical garden at the capital with the hope of improving the quality of the plant.

GEOGRAPHICAL RECORD

AFRICA.

Surveys in South Africa.—The report of the Astronomer at the Cape of Good Hope for 1903 announces the completion of the field work and computations relative to the survey of the Anglo-German boundary of Southwest Africa, while the reduction of the geodetic survey of Southern Rhodesia is also completed. Operations in connection with the measurement of the arc along the 30th meridian, from the Zambezi to Lake Tanganyika, under the direction of Dr. Rubin, were in progress during the year, but owing to grass fires little could be done beyond reconnaissance, beaconing, and astronomical observation.

As a result of Lord Milner's endeavours for the creation of a topographic survey of British Africa south of the Zambezi, we learn that the Transvaal and Orange River Colonies have provided an organization sufficient to complete the principal triangulation of these colonies in three or four years and to make connection with the systems of principal triangulation in the Cape Colony and Natal. It is also proposed to carry out the triangulation through Basutoland and the portion of Zululand annexed to Natal, the cost to be defrayed by the Governments concerned. Thus, it is shown, the whole of British South Africa, with the exception of Bechuanaland, will be on an equality in the matter of survey should the Government of Rhodesia agree to the connection of Gwelo with the geodetic system south of the Limpopo.—(The *Geog. Jour.*, April, 1905.)

Railroad Progress in Africa.—The *Deutsches Kolonialblatt* for March 1 has a map showing the route of the Tanga Railroad, in German East Africa, from the port of Tanga to Mombo, on the western side of the Usambara highlands. The railroad reached this point on February 19, thirty miles northwest of Korogwe, which had been the terminus for a considerable period.

A British Bluebook of December, 1904, says that in Sierra Leone 135 miles of narrow gauge railroad (2 feet 6 inches) are in operation, and 87 miles are in course of construction; 125 miles (3 feet 6 inches gauge) have been completed in Lagos, and 170 in the Gold Coast; or a total of 430 miles in operation in the three colonies. Rapidity of construction is not aimed at, the building being carried on tentatively in sections, to gain experience and prove the value of the enterprises. The difficulties encountered in West Africa have included "the want of landing facilities, sickness of the staff, excessive rainfall, obstruction caused by dense tropical forest, and the necessity of carrying on the entire work and conveying all the materials from one base."

Paleozoic Glaciation in the Transvaal.—Near Balmoral, in the Transvaal, there are some undoubted evidences of ancient glaciation in the beds of the Karroo system which underlie the coal treasures. These are fully described by E. T. Mellor in the Report of the Geological Survey of the Transvaal for 1903, and several excellent photographs indicate how unquestionable the evidence is. This evidence consists of both glacial deposits and glacial striæ on the bed-rock. The deposits were laid down upon a varied land surface "which had already undergone considerable disturbance and denudation." They consist of conglomerates, sandstone and shales, collectively known as the Dwyka conglomerate. The beds are

irregularly alternating and more or less lenticular, including many boulders of various kinds embedded in clay or sandy matrix full of smaller angular rock fragments, the whole bearing a close resemblance to glacial till, which is increased by the polished, facetted, and frequently-striated faces of the boulders. The photographs of glacially-striated bed-rock show markings so clear and distinct that they might pass for photographs of striations made by the Quaternary ice-sheet of North America.

This exceedingly clear case of ancient glaciation, to be added to the few already known, is of great interest to glacialists. Mellor is of the opinion that the phenomena demand for their explanation not mere local glaciers, but a genuine ice-sheet of continental character. This conclusion seems warranted by the widespread extent of the glacial deposits in both the Transvaal and Cape Colony, and by the uniformity of direction of the glacial striæ which, in places fully 25 miles apart, are from north-northwest to south-southeast. R. S. T.

The Macmillan Expedition.—Mr. W. Macmillan, of St. Louis, Mo., and his party, after completing early last year the exploration of the southern boundary of Abyssinia, and investigating the connection of the rivers near Lake Rudolf with the Nile system, returned in July to Khartum and Cairo, where another trip into Uganda was arranged, from which the party has recently returned. Leaving Mombasa in the middle of September, the explorers proceeded to the Athi Plains, and thence from Eldoma Ravine across the Gwasongishu Plateau to Mont Elgon. Mr. Macmillan is now organizing a further expedition up the Blue Nile, in order to establish a commercial river route between Abyssinia and the Sudan, and has had built in Norway a flotilla of specially-designed wooden vessels for the navigation of the rapids. It is expected that a start will be made during the present month.—(*Scot. Geog. Mag.*, April, 1905.)

AMERICA.

Petroleum Fields of Alaska and the Coal of Bering River.—The U. S. Geological Survey presents (*Bull.* No. 250) a report of the preliminary examinations of the structural and economic geology of the localities in Alaska where indications of petroleum have been found. The studies for this report were made by Mr. George C. Martin. In transmitting the report to Director Walcott, Mr. Brooks, in charge of the division of Alaskan Mineral Resources, says that though only few wells have been drilled, and it is too soon to predict an important future for Alaska as a petroleum-producer, Mr. Martin's studies show that there is ample justification for further prospecting, and that the region may yet be an important source of illuminating oil.

Mr. Martin's report also gives an account of the Bering River coal deposits, which contain the best coal yet found on the Pacific coast of the continent. Further investigation of these coal and petroleum fields has already begun.

These fields, though widely separated, are all on the southern coast of Alaska, and except the Bering River coal fields, are on tide-water. The petroleum field of Controller Bay is east of the mouth of Copper River; the Cape Yaktag fields are 75 miles farther east. The Cook Inlet fields are about 320 miles west of Controller Bay, and the Cold Bay field is about 160 miles to the southwest on the southern coast of the Alaska Peninsula. The Bering Sea coal fields are from 20 to 40 miles from the coast, in the valley of Bering River, which flows into Controller Bay. All the petroleum regions may be reached directly by steamer from Seattle, except the Cape Yaktag field, where there is no regular steamer landing.

Mr. Martin describes the geological formation of each of these regions. In the

Controller Bay district petroleum seepages are very abundant. The petroleum is seen oozing from the joints and bedding planes of the carbonaceous shales and volcanic ash-beds. Fifteen wells had been drilled, or were drilling, in this region in September last year. None of them had reached a depth exceeding 1,100 feet, and oil in commercial quantities had not yet been produced.

At Cape Yaktag there are said to be good seepages in several of the creeks, but no development work has been done owing to the difficulty of transporting machinery. In the Cook Inlet region the surface indications of petroleum consist of seepages or oil-springs and the so-called "gas" springs. In the first, the petroleum may be seen oozing from the cracks in the rock, or coming out of the soil. More drilling is necessary to obtain a knowledge of the underground conditions, as well as to estimate the economic and commercial value of the field. In the Cold Bay district the flow of petroleum from seepages at several points near the oil wells is large and constant. One of them supplies lubricating oil for use at the wells, three of which were begun in the summer of 1903. If petroleum should be discovered in commercial quantities in this region, it may be piped to Coal Bay by gravity, and shipped thence to southern ports. A few tests of the petroleum show that it is a refining oil of the same general nature as the Pennsylvania product.

The Bering River coal area, as far as known, is restricted to the region north of Bering Lake and Bering River, embracing an area of about 120 square miles. The seams vary in thickness from a few inches to 31 feet, and it is reported that a thickness of over 60 feet was found in a tunnel on the north side of Stillwater Creek. The coal resembles the harder bituminous coals of the East more than it does anthracite. Under ordinary handling it will probably crush to almost the same extent as the harder semi-bituminous coal, which will not impair its value for steam purposes, but will necessitate careful handling if it is to compete with Pennsylvania or Welsh anthracite as a domestic fuel. The seams exposed along Shepherd Creek not only possess the greatest thickness, but are also the purest coals and have the highest heating power.

A Primer of Forestry.—This book of 88 pages, by Mr. Gifford Pinchot, Government Forester, is printed as *Bulletin* No. 34, Part II, in the Bureau of Forestry, Department of Agriculture.

It will be attractive to the general reader as well as valuable to all who desire to make practical application of the principles of forestry. It first describes the service and uses of the forest, which, when held as productive capital, is useful in proportion to the interest it yields:

> Thus, an acre of sprout land may be worth only $5, while the investment in adjoining land stocked with old trees may be $50 an acre. This is the view which controls the management of State forests in Germany.

There are four things a forest requires for the best service: Protection, strong and abundant reproduction, a regular supply of trees ripe for the axe, and space enough for every tree. The annual yield should be as nearly equal as possible. The various methods of handling forests are discussed. Our lumber men disregard the future of the yield altogether, and in consequence the forest loses its capital value. A chapter is therefore given to wasteful methods, in contrast with methods that are conservative and that renew the supply. How to plant trees, the climatic influences affecting forests, etc., are treated in detail, and the book closes with a comparison between forests in foreign countries and at home which is full of useful information for our tree-growers:

> The first professional foresters in the United States were obliged to go abroad for their training;

but in 1898 professional forest schools were established at Cornell University in New York, and at Biltmore in North Carolina, and they were followed by the Yale Forest School in 1900. Others have sprung up since. At present thorough and efficient training in professional forestry may be had in the United States.

Forty-nine illustrations, nearly all half-tone, are a helpful feature of the book, which should be in the hands of every owner of forest lands.

BIBLIOGRAPHY OF PAPERS ON UNDERGROUND WATERS PUBLISHED BY THE U. S. GEOLOGICAL SURVEY.—A bibliography of all the publications of our Geological Survey relating to underground waters, and issued between 1879 and 1904, appears as Water Supply and Irrigation Paper No. 120. There are about 600 titles, the papers averaging about 21 for each year, from 1880 to 1903; while in 1904, owing to the publication of the work of the new division of hydrology, the number was increased to about 130. The bibliography is supplemented by an index which facilitates reference to the various groups of topics and to papers relating to underground waters in various States and in other political and natural divisions.

STREAM MEASUREMENTS IN 1903.—The Geological Survey has published in Water Supply and Irrigation Papers (Nos. 97–98) progress reports of stream measurements in 1903. Part I includes Northern Atlantic, Saint Lawrence and Great Lakes drainages, and Part II Southern Atlantic, eastern Gulf of Mexico, and eastern Mississippi River drainage. Part III, yet to appear, will embrace the western Mississippi River and western Gulf of Mexico drainage, and Part IV the Interior Basin, Pacific, and Hudson Bay drainage. The requests for information from the general and engineering public concerning stream data are constantly increasing. These papers contain data collected at the regular gauging stations, the results of computations based upon them, and other information useful in hydrographic studies. Each volume has a map of the United States showing the principal river stations maintained during the year.

CURRENTS OFF SOUTHERN NOVA SCOTIA.—The Department of Marine and Fisheries of Canada has published a report by Dr. W. Bell Dawson on "The Currents at the Entrance of the Bay of Fundy and on the Steamship Routes in its Approaches off Southern Nova Scotia." The data are taken from the investigations of the Tidal and Current Survey in 1904. The currents were taken 3½ to 15 miles off shore on the routes usually followed by steamships. They are predominantly tidal, running strongly during flood and ebb in the two directions, which are usually opposite. The characteristic of the current which deserves special attention is the change found at points only a few miles apart. In passing islands the strength may vary greatly, according to the offing. In channels and passages there may be a difference of an hour between the centre and the sides in the time of slack-water. Almost everywhere the current is as strong down to a depth of 30 fathoms as it is on the surface. There is no general movement of the water in any one direction which is at all well marked.

TWO NEW PROVINCES IN CANADA.—A bill was introduced before the Canadian Legislature on February 21 for the creation of two new Provinces or States embracing the region occupied by those territorial divisions of the North West Territories known as Athabasca, Alberta, Saskatchewan, and Assiniboia. The western Province is to be called Alberta, and the eastern Saskatchewan, and they will extend from Manitoba to the Rocky Mountains, and from the United States to the 60th parallel. The two Provinces will divide this vast area nearly equally, each with an area of about 225,000 square miles. The bill provides that each Province shall have a Legis-

lative Assembly of 25 members, and that the Capital of the Saskatchewan shall be Regina, heretofore the Capital of the North West Territories. The Capital of Alberta will be temporarily at Edmonton, until the Legislature of that Province decides upon its permanent situation. The date proposed for the creation of the new Provinces is July 1 of this year. It is also reported that the Provinces of Quebec, Ontario, and Manitoba may all be extended northward to the shores of Hudson Bay.

ARCTIC.

A SCIENTIFIC STATION AT DISCO.—The latest development in the scientific study of Greenland is to be the establishment of a station on Disco Island under charge of Mr. Porsild, assistant in the Botanical Garden at Copenhagen. The Danish Government has voted a small sum to erect and equip the station, which will probably be located at Godhavn. Mr. Porsild has also the support of several of the Danish learned societies. The purpose of the station will be largely to study all the biological conditions of Greenland. Much attention will also be given to other questions of polar geography, so that the station may become a centre of scientific polar exploration. It is hoped that its work will, to some extent, ameliorate the conditions of life of the 10,000 Eskimos who inhabit the southwest coast of Greenland. Mr. Porsild, for example, hopes to be able to show that the cultivation of certain grasses will enable the Greenlanders to add cattle to their resources, and also stimulate them to raise some of the hardier varieties of vegetables. He will endeavour also to quicken their interest in fishing, as there seems to be no reason why an important industry of this nature should not be developed along their coast.

AUSTRALIA.

DRAINING COASTAL SWAMPS IN NEW SOUTH WALES.—The State of New South Wales has begun to drain its swamps along the coast to increase the agricultural area. Some of the richest lands in the State (*Jour. and Proc. of the Royal Society of New South Wales*, 1904) are the coastal swamps in the humid region, which, in their virgin state, are useless for any purpose, but, when drained, are capable of supporting a dense population. Most of these swamps are close to the coastal rivers, easy of access, and only require drainage works, and in some cases works for water supply; for it is found that, when the larger swamps are drained, artificial means of providing water for stock are usually necessary. Drainage works have been completed on the Duranba swamp on the Tweed River, and are in progress on the Coopernook swamp on the Manning River. Plans are being prepared for dealing with other coastal swamps. It is expected that the Macleay Swamp, having an area of 60,000 acres, will be drained.

EUROPE.

A NEW CAVE IN AUSTRIA.—The Trieste Touring Club has discovered a cave of large extent at Markovsina, near that city. It has many very large chambers filled with stalactites of unusual beauty, and it far surpasses in extent and natural decoration all the other caves of the Karst region discovered up to the present time. The interior of the cavern is reached through two perpendicular chasms, one 115 and the other 72 feet deep. At the bottom of the grotto is a great water-course running the entire length of the main cavern. Many side passages leading to parallel caverns have been discovered, all of them containing groups of highly-coloured sinter formations. A number of blind troglodyte animals were found. There is another

passage into the cavern, which at present is impassable on account of the fallen rocks; but below it is a fine deposit of the fossil remains of animals dating from the Ice Age.

Barley and Rye Growing 6,900 Feet Above Sea-Level.—This picture shows some fields of barley and rye above the hamlet of Findelen, in the Alps. Findelen is on the sunny southern slope of a little valley, which ends in the neighbourhood of Zermatt. At an altitude of about 6,800 feet, it is the highest permanent settlement in Switzerland excepting Juf, which stands about 190 feet higher. As the slope fully faces the south it is warmed by the direct rays of the summer sun, enabling cultivation to be carried on at a much higher altitude than on neighbouring slopes with northern exposure.

Thus one may stand in midsummer beside these fields of yellow grain and see not far away the marvellous ice-fields and snows of the Findelen and Strahlhorn glaciers; and on the northern slopes, which have no sunshine for much of the day, there is an Arctic-Alpine flora and patches of snow below the level of the grain fields on the southern slope. A few hundred yards separate from one another two kinds of vegetation that at lower levels of the earth surface are 25° of latitude apart. This curious example of the importance of a southerly exposure in Swiss agriculture is taken, with the picture, from *La Géographie*, No. 3, 1905.

The Effect of Geological Formations upon the Distribution of Population in Sweden.—According to *Ymer* (Häft 3, 1904), Mr. Per Stolpe has been studying the geological deposits in relation to the density of population in Sweden, and finds that there is a remarkable connection between them, though other factors have doubtless contributed to the present distribution. The influence of the limits of marine deposits, the occurrence of calcareous soil, and the surface topography are plainly marked in the distribution of the people. The calcareous soils derived from

the Silurian formation are especially productive, and thus encourage intensive agriculture. It is also notable that vegetation is more luxuriant on the soils formed from the latest eruptive rocks, basalt and rhyolite, than in the neighbouring districts. Among the other factors influencing the distribution are, of course, the climate and the concentration of population in the lumber and iron districts.

OCEANIA.

Flora of the Islands South of New Zealand.—The flora of the small islands to the south of New Zealand (Auckland, Campbell, Antipodes, Bounty, etc.) presents interesting problems in connection with the distribution of plants over the southern part of the southern hemisphere. These islands have many floral affinities with New Zealand, but they also contain an element to which the name "Fuegian" has been given by botanists. Our knowledge of their flora has lately been extended by Dr. L. Cockayne, who, in 1893, visited most of the groups in winter. All previous botanical observations had been made in spring or summer. He communicates his results to the *Transactions and Proceedings of the New Zealand Institute* (Wellington, 1904), to the following effect:

The general character of the climate of all the islands is marked by cloudy skies, frequent showers, mild winters and cool summers, with furious gales accompanied by hail or sleet, the effect of which upon the trees is marked. In the "Rata-forest" of Auckland group the low summer temperature and the furious winds have led the trees to form a dense flat roof of foliage with a luxuriant lateral growth of the branches, and beneath this canopy the hygrophytic factors exercise full sway, as shown by the abundance of filmy ferns, liverworts, etc. Another type of forest is that of the *Olearia Lyallii*, which occurs locally only, but grows with great luxuriance, so that there seems no reason why it should not be the dominant forest of the southern islands. Sheep farming is carried on in Campbell Island. Of the flowering plants, 39 per cent. are endemic, 18.8 per cent. Fuegian (including five per cent. which do not extend to New Zealand), and 42 per cent. New Zealand, excluding those also Fuegian. Of the plants which extend to New Zealand nearly half are mountain plants, the remainder including plants of the sub-Alpine and Alpine regions. Dr. Cockayne believes that the presence of the Fuegian element is due to former land connections rather than to the agency of birds, winds, currents, etc.—(Condensed from *Geog. Jour.*, April, 1905.)

A Tornado in the Vavau Islands.—*Les Missions Catholiques* (March 24, 1905) publishes a number of half-tone pictures showing the devastation wrought by a tornado in the Vavau group, east of the Fiji islands, on Dec. 29 last. The pictures show houses overturned, trees uprooted, cocoanut trees stripped of their leaves, plantations destroyed, and crops ruined. The devastation was almost complete, and if it were not that the natives can soon replace their dwellings and raise new crops the suffering would be greatly intensified. The article describing the pictures says that the wind blew with extraordinary violence for two hours, the storm being accompanied by a deluge of rain. All the missionary houses, including the church, were destroyed or badly damaged. The sailing vessel in which the missionaries visited their stations on forty islands was dashed to pieces. As soon as the hurricane had passed there was complete calm, and the bright moonlight revealed the terrible work of destruction.

GENERAL.

Kolonial Handels-Adressbuch, 1905.—The Kolonial Wirtschaftliches Komitee of Berlin has issued the ninth edition of this annual reference book, con

taining the usual amount of diversified information concerning the German colonies. There are coloured maps of all the colonies, complete lists of the planters, merchants, and labourers, statistics of the Societies in Germany interested in colonial development, and information relating to the government of each colony, the military forces employed, the missionary work, Government schools, trading companies, communications by steamships and sailing vessels, railroad development, Customs duties, and trade statistics. No more complete compilation of the kind is published by any other colonial nation, and this annual is essential to all who wish to keep informed as to the latest phases of progress in the German colonies.

HANGING VALLEYS.—Normally a tributary stream enters its main valley with a grade adjusted to the level of that valley. This is a normal result of the formation of valleys by stream erosion. There are, however, numerous instances of tributary valleys which depart widely from this condition, and have their mouths hanging high —in some cases a thousand or fifteen hundred feet above the bottom of the main valley. Such a condition is common in glaciated countries, and especially in regions where valley glaciers have passed down the main valleys, as in the Alps, the Sierra Nevadas, Alaska, and Norway. To account for this abnormal discordance of main and tributary valleys ice-erosion has been appealed to by a number of geographers in Europe and America; but others have opposed the ice-erosion theory, primarily on two grounds: (1) the supposed inefficiency of ice as an agent of erosion; (2) the vast amount of erosion which the theory of ice-erosion demands, and the absence of proof of such erosion in the form of correlative deposits. As a result of this difference in interpretation, there has in recent years arisen a literature of considerable extent devoted to the two sides of the subject.

One of the most recent contributions to the discussion is by Prof. H. L. Fairchild (*Bull. Amer. Geol. Soc.*, Vol. 16, 1905, pp. 13–74), under the title: "Ice-Erosion Theory a Fallacy." While there is much of value in this paper, there is also much that is inconclusive. The conclusion regarding hanging valleys—one of the main arguments for marked glacial erosion—does not leave the subject of their origin in a very satisfactory state, for, while vigorously asserting that "the ice-erosion argument for hanging valleys is illogical," Mr. Fairchild has nothing better to substitute than the following: "these features will, undoubtedly, be explained as normal product of atmospheric and stream work under conditions not yet understood."

The article next succeeding this one in the same publication (pp. 75–90), by Prof. I. C. Russell, is devoted specifically to hanging valleys. Russell shows that hanging valleys may result from four different causes: (1) by the deepening of a main stream more rapidly than a tributary under certain favourable conditions; (2) by the cutting back of a river mouth by waves along a shore-line; (3) by crustal movements; (4) by glacial action. He admits that the great abundance of hanging valleys in glaciated regions calls for an explanation, which involves former glaciation; but, instead of explaining them as the result of great deepening of the main valley, he states six sets of conditions under which the hanging valleys may be developed without great differential ice-erosion. In his paper Russell considers certain specific instances, and also generalizes on the subject as a whole. His paper is of decided importance, because it calls attention to the complexity of the subject and the possibility of alternate explanations. It contributes facts and sane discussion on a subject which needs such contributions.

R. S. T.

ACCORDANCE OF SUMMIT LEVELS AMONG ALPINE MOUNTAINS.—That there is a general accordance in elevation among peaks in many, if not all, mountain ranges is generally admitted. That this accordance is due to a former reduction of the

mountains to the condition of a low-lying peneplain and subsequent uplift and dissection is almost universally held by American physiographers. So far has the theory of peneplains been extended that a good share of the earth's surface, including mountains, plateaux, and plains, has been interpreted as regions of ancient peneplaination. Mountain ranges 12,000 to 13,000 feet high are believed to furnish evidence of such reduction. A few workers have failed to be convinced by that evidence, which has led some of our keenest physiographers to apply the explanation of peneplaination to so much of the earth's surface; but the literature of peneplains has steadily increased, and one has come to expect descriptions of new peneplains whenever a new region is studied.

Papers opposing the theory are much more rare, and consequently more noteworthy; and among these papers a recent one by Dr. R. A. Daly (*Journ. Geol.*, Vol. XIII, 1905, pp. 105–125) is especially noteworthy, because written by a man who has hitherto been an advocate of the peneplain theory, and who has recently spent much time in the Canadian Selkirks, to which the the theory of peneplaination has been already applied. Dr. Daly still adheres to the peneplain theory as applied to some regions, but he finds difficulty in accepting it for lofty mountains. He states his belief "that further constructive work along the lines of the peneplain theory is at present not so necessary as a critical inquiry into alternative hypotheses." He proceeds to state an alternative hypothesis, consisting of a series of conditions which tend to bring about a rough accordance of summit levels among mountains. Among these conditions are original isostatic adjustment, later isostatic adjustment, the influence of metamorphism and intrusion, and subsequent differential erosion, due to a variety of conditions, which tend to lower the higher peaks faster than the lower ones. It seems to the reviewer that this alternative explanation is worthy of the most careful attention of physiographers. R. S. T.

A Study of Rubber Plants.—All who are especially interested in the rubber industry may desire to add to their libraries the valuable study by Mr. Peter Reintgen "Die Kautschukpflanzen," which has just been issued as a supplement to the monthly publication *Tropenpflanzer*. This industrial-geographical study has 218 pages, a list of books used, and a map showing the distribution of rubber plants. Part 1 gives a concise history of the discovery of rubber-yielding plants and of the scientific study of them, and deals with the physical and chemical nature of rubber and the present conditions and prospects of its cultivation. The larger part of the volume is given to the treatment in turn of all phases of the various rubber-yielding plants, including the conditions of their growth, their industrial importance, and the efforts thus far made to cultivate them. The plants are classed for this discussion in the three productive areas of America, Africa, and Asia-Australia. The statistics of the trade are given for each of these areas and the subdivisions of the rubber territory in them. It is noteworthy that the largest part of the literature on this subject has been produced in the past few years, since the suddenly-augmented importance of the industry gave it an impetus.

The Elisha Kent Kane Medal.—The Geographical Society of Philadelphia on May 3, awarded the Elisha Kent Kane Medal to Professor William B. Scott, Professor of Geology and Palaeontology in Princeton University. Professor Scott was editor and joint author of the Reports of the Princeton University expeditions to Patagonia.

Sverdrup Going to the West Indies.—The Arctic explorer, Captain Otto Sverdrup, is about to start for the West Indies to take charge of the work of a plant-

ing company. The condition of his health seemed to make it desirable to live for a while in a southern climate.—(*Allgemeine Zeitung.*)

M. VIDAL DE LA BLACHE HONORED.—This well-known French geographer, President of La Société de Topographie de France, has received the medal of the Paris Geographical Society in recognition of his work, "Tableau de la Géographie de la France," which is the introduction to the "Histoire de France," which is published under the direction of M. E. Lavisse.

M. LEVASSEUR BECOMES PRESIDENT OF THE COLLÈGE DE FRANCE.—This distinguished geographer and statistician has succeeded M. Gaston Paris at the head of the Collège de France. He has long been associated with its executive force, and was at the same time Professor of History, Economics, and Geography.

ANNUAIRE ASTRONOMIQUE POUR 1906.—This Annual, printed under the direction of Mr. G. Lecointe, has been issued by the Royal Observatory of Belgium since 1834. It not only contains tables and other information for the convenience of astronomers, but is also popularized by the inclusion of many elementary facts and explanations, so that it may be useful to the amateur and the general public. In the 388 pages are included, for 1906, the Gregorian, Julian, Jewish, and Mohammedan calendars, ephemerides for the sun, moon, and planets, eclipses and occultations, apparent positions of some of the stars, the tides, terrestrial magnetism, many astronomical tables, formulas, diagrams, etc.

FREDERIK MULLER & CO., Amsterdam, send one of their valuable catalogues, of more than 3,200 works, on Voyages, Discovery, Geography, and kindred subjects, selected and described, as always, with care and accuracy.

The catalogue is written in French, but the titles are given in the original languages.

IN AN EXCELLENT FRENCH TRANSLATION of Mr. Jeremiah Lynch's *Three Years in the Klondike*, published by Delagrave, Paris, the following note on page 44 bears testimony to the translator's acquaintance with Shakespeare and Keats, and his lack of familiarity with the slang term for *partner*:

1. *Pard*, appellation familière; exactement, *léopard*. (N. du tr).

NEW MAPS.

AFRICA.

AFRICA.—Carte des Missions Catholiques en Afrique. Scale, 1:10,000,000, or 157.8 statute miles to an inch. Supplement to *Les Missions Catholiques*, No. 1875. Lyons, 1905.

Shows the boundaries of the Vicarates, seats of the archbishops and bishops, the distribution of the mission stations, etc. A part of the sheet is filled with notes and tables, giving the condition of Roman Catholicism in Africa according to the official reports of the missions for 1904–05.

AMERICA.

UNITED STATES.—General Chart of Alaska. Scale, 40 statute miles to an inch. In *Reindeer Report* by Dr. Sheldon Jackson, Washington, D. C., 1905.

This map is based upon the post-route map issued by the Post Office Department.

It shows the location of all post offices, public schools, and reindeer stations, and also the mission stations, indicating the denominations or sects to which they belong. The steamer routes are indicated with the number of round trips between various ports on each route during the season of navigation.

United States.—Sketch Map of Reindeer Stations and Routes of Travel. Scale, 100 statute miles to an inch. Accompanying *Reindeer Report*, Washington, D. C., 1905.

Shows the existing reindeer stations, the proposed stations, and the routes of reindeer travel thus far outlined, and covering a large part of the territory north of Alaska Peninsula.

United States.—Map of the Controller Bay Region, Alaska. Scale, 6.5 statute miles to an inch. *Bull.* No. 250, U.S. Geol. Surv., Washington, 1905.

Shows the petroleum field in the Controller Bay district and locates the development work.

United States.—Geologic Reconnaissance Map of the Cook Inlet Petroleum Fields. Scale, 3.5 statute miles to an inch. Surveyed with traverse plane table by G. C. Martin. *Bull.* No. 250, U.S. Geol. Sur., Washington, 1905.

Denotes the geology in colours. Oil derricks are shown. The area carrying petroleum is dark shale with basal conglomerate and some sandstone and limestone.

United States.—Sketch Map of Cold Bay Petroleum Field, Alaska. Scale, 18 statute miles to an inch. *Bull.* No. 250, U.S. Geol. Sur., Washington, 1905.

The above three maps illustrate *Bulletin* 250 on "The Petroleum Fields of the Pacific Coast of Alaska, with an Account of the Bering Sea Coal Deposits," by George C. Martin. This sketch of the Cold Bay field is a black map indicating the geology and the situation of the derricks and trails.

United States—North Carolina.—Oyster Chart of Newport and North Rivers, North Carolina. Containing the Data collected by the U.S. Fish Comm. Str. Fish Hawk during the Fall of 1899. Scale, 1 nautical mile to 2.43 inches. *Report* for 1903 of the U. S. Fish Commission, Washington, 1905.

Showing the location and extent of the natural oyster beds, areas of dense or scattered growth of oysters, artificial beds, and character of bottom.

United States.—Geologic Atlas of the United States. No. 120. Silverton Folio. Colorado, 1905.

The descriptive text is 34 pages in length, making the folio unusually long. It deals with the district between 37° 45′ and 38° N. Lat. and 107° 30′ and 107° 45′ W. Long. (area, 235.66 square miles) in the famous San Juan mining region of South-western Colorado. The total production of metals in the Silverton quadrangle to the close of 1900 was at least $35,000,000, chiefly silver and lead. The topographic sheet shows the very rugged topography, with an average elevation of about 11,500 feet, with summits reaching above 14,000 feet, and Silverton, on the broad floodplain of the Animas River, the natural commercial centre of the district. A sheet of photographic illustrations shows landslide surfaces in the region of Red Mountain Creek, talus piles in Horseshoe Basin, rock stream in Silver Basin, torrential fans, and two fine views, one of them from Snowdon Peak.

Canada.—Half Tide Chart Showing Greatest Strength of Flood and Ebb Corresponding to a Range of 24 Feet at St. John, N. B. Scale, 9 nautical miles to an inch. Tidal and Current Survey, Department of Marine, Ottawa, 1905.

The direction of the current and the strength in knots at half tide, flood, and ebb are shown.

BOLIVIA.—Sketch Map illustrating the Explorations in Bolivia, by Dr. Steinmann, Dr. Hoek, and Dr. v. Bristram. Scale, 1:3,000,000, or 47.34 statute miles to an inch. The *Geog. Jour.*, May, 1905, London.

The map shows, as clearly as can be done on the small scale, the improvements added by this Exploration to the topographic delineation of a large part of western Bolivia. Corrections and additions to the earlier mapping have been made in these districts: The northern end of the Cordillera de Victoria; the Pampa de Tacsara, between Yavi and Tarija; the Cordillera de Liqui; the mountains in the east of Potosi, called the Cordillera de Potosi, and divided into the groups of Andacaba and Cari-Cari; the head of the Pilcomayo, between Mataca and Icla; the ranges of the Cerro Tunari, north-west of Cochabamba; the ranges of Santa Veracruz, Quimzacruz, and Araca, which form the continuation to the south of the Illimani group. The height of about 235 points was determined by aneroid checked by boiling-point thermometers. The latitude of a large nnmber of places in southern Bolivia was fixed, as also the longitude of Tarija and Potosi, the latter by telegraphic time signals from the observatory of Cordoba.

ASIA.

CHINA.—Sketch Map illustrating the journey of the Rev. J. Headley in the Chili Province. Scale, 1:750,000, or 11.83 statute miles to an inch. The *Geog. Jour.*, May, 1905, London.

Shows the route traversed for 550 miles to the northeast of Peking, with many new place-names.

TIBET.—Sketch Map of part of Tibet showing Route of the British Expedition to Lhasa, 1904. Scale, 1:1,500,000, or 23.7 statute miles to an inch. The *Geog. Jour.*, May, 1905, London.

Illustrating a paper by Sir Frank Younghusband on the geographical results of the mission. An important amount of detail as to topographic features on both sides of the route between the south border of Tibet and Lhasa is thus added to mapping facilities.

EAST INDIES ARCHIPELAGO.

TIMOR.—Karte van een gedeelte van het eiland Timor. Scale, 1:500,000, or 7.8 statute miles to an inch. *Tijdschrift* of the Royal Netherlands Geographical Society, Vol. 22, No. 3. Leiden, 1905.

Shows bridle and foot paths and rivers and was especially designed to show the boundaries between the Dutch and Portuguese districts according to the treaty of 1904.

EUROPE.

SWEDEN.—Djupkarta öfver Siljan. Scale, 1:200,000, or 3.1 statute miles to an inch. *Ymer*, Häft 1, 1905, Stockholm.

A bathymetrical map of this Swedish lake, with 4 tints showing the conformation of the lake-bed. Through the centre of the lake extends a long, very narrow trough, where the waters are over 100 metres deep.

ICELAND—DIE BRUCHLINIEN ISLANDS. Von Th. Thoroddsen. Scale, 1:2,300,000, or 36 statute miles to an inch. *Pet. Mitt.*, Vol. 51 (1905), No. 3. Justus Perthes, Gotha.

The map illustrates a paper by Dr. Thoroddsen on fault-lines in Iceland and their relation to the volcanoes. Lines of faulting and folding, fissures, lines along

which craters are developed, and volcanoes, ancient and post-glacial, are shown; also the areas subject to earthquakes. Appended to the map are 16 sketches showing some of the crater-forms in Iceland. The article is a concise discussion of the phenomena represented on the map. Dr. Thoroddsen is to develop the subject more exhaustively in a supplement to *Petermanns Mitteilungen.*

GENERAL.

STIELER'S HAND-ATLAS.—Neue neunte Lieferungs-Ausgabe. 100 Karten in Kupferstich. Lieferungen 45–46. Justus Perthes, Gotha, 1905. (Price, 60 pf. for each part containing 2 map sheets.)

Nos. 1 and 2 are new maps by Dr. Rohrbach of the Northern and Southern Constellations, distinguishing between the stars of different magnitudes, those that may be seen with the naked eye, small or large telescope, etc. Nos. 96 and 98 are sheets 2 and 4 of the revised 6-sheet map of South America.

WORLD.—Verbreitungsgebiet der Kautschukpflanzen. (Mercator Projection.) Beihefte zum *Tropenflanzer.* Vol. 6, No. 2/3 (May, 1905), Berlin.

Illustrates an industrial-geographical study by Peter Reintgen on rubber plants. The map distinguishes between the richest rubber regions, those where the crop is of some importance, and those where the plants exist, but not in commercial quantities. The entire rubber belt lies within the tropics, except that it pushes a little north of the Tropic of Cancer in British India.

ACCESSIONS TO THE LIBRARY.

APRIL–JUNE, 1905.

AFRICA.

AFRIKA, AUS SÜDWEST. Blätter aus dem Tagebuche einer deutschen Frau. 1902–1904. Titelbild und Abbildungen. Leipzig, Veit & Co., 1905. 8vo.

BALFOUR, ANDREW.—First Report of the Wellcome Research Laboratories at the Gordon Memorial College, Khartoum. [Map and Plates.] Khartoum, Dep't of Education, Sudan Government, 1904. 4to. [*Gift from the Author, Director of Gordon Memorial College.*]

CORRY, JOSEPH.—Observations upon the Windward Coast of Africa, the Religion, Character, Customs, &c., of the Natives; &c., &c. (Map and 8 Plates.) London, G. and W. Nicol, 1807. 4to.

DAVIDSON, JOHN.—Notes taken during Travels in Africa by the late ———. *Printed for private circulation only.* 3 Plates. London, J. L. Cox & Sons, 1839. 4to.

EAST AFRICA, UGANDA AND ZANZIBAR. Handbook, 1905. (Map.] Mombasa [Gov't print.] 1905. 12mo.

EGYPT EXPLORATION FUND. Twenty-fourth Memoir: Abydos, Part II., 1903. By W. M. Flinders Petrie. With Chapter by F. Ll. Griffith. (Plates.) London, Egypt Ex. Fund, 1905. 4to.

EGYPT EXPLORATION FUND. Twenty-sixth Memoir: Ehnasya, 1904. By W. M. Flinders Petrie. With Chapter by C. T. Currelly. (Plates.) London, Egypt Ex. Fund, 1905. 4to. *With Special Extra Publication:* Roman Ehnasya: Plates and Text Supplementary to Ehnasya. 1905. 4to.

EGYPT EXPLORATION FUND. Special Extra Publication: Abydos, Part III., 1904. By E. R. Ayrton, C. T. Currelly and A. E. P. Weigall. With Chapter by A. H. Gardiner. (Plates.) London, Egypt Ex. Fund, 1904. 4to.

EGYPT EXPLORATION FUND. Special Extra Publication: El Amrah and Abydos, 1899–1901. By D. Randall-Maciver and A. C. Mace. With Chapter by F. Ll. Griffith. (Plates.) London, Egypt Ex. Fund, 1902. 4to.

EGYPT EXPLORATION FUND. Special Extra Publication: Coptic Ostraca. From the Collections of the Egypt Exploration Fund, the Cairo Museum and Others. The Texts edited with Translations and Commentaries by W. E. Crum. Contribution by Rev. F. E. Brightman. (Facsimiles and Plates.) London, Egypt Ex. Fund, 1902. 4to.

EGYPT EXPLORATION FUND. Archæological Survey of Egypt. Twelfth Memoir: Rock Tombs of Deir Dl Gebrâwi, Part II. By N. de G. Davies. Appendices by W. E. Crum and G. A. Boulenger. 29 Plates and Frontispiece. London, Egypt Ex. Fund, 1902. 4to.

EGYPT EXPLORATION FUND. Archæological Survey of Egypt. Thirteenth Memoir: Rock Tombs of El Amarna, Part I. By N. de G. Davies. 42 Plates. London, Egypt Ex. Fund, 1903. 4to.

EGYPT EXPLORATION FUND, Græco-Roman Branch. New Sayings of Jesus and Fragment of a lost Gospel from Oxyrhynchus. Edited, with Translation and Commentary by Bernard P. Grenfell and Arthur S. Hunt. Plate. Published for the Fund by Oxford University Press, American Branch. New York. (1904.) 8vo.

ELIOT, SIR CHARLES.—East Africa Protectorate. Maps, &c. London, Edward Arnold, 1905. 8vo.

FORBES, HENRY O., *Editor.*—The Natural History of Sokotra and Abd-El-Kuri. Being the Report of the Expedition . . . 1898–99, by W. R. Ogilvie-Grant and ——. (3 maps, &c.) Liverpool, Free Public Museums, 1903. 8vo.

HALL, R. N.—Great Zimbabwe, Mashonaland, Rhodesia. Two Years' Examination Work, 1902–4, on behalf of the Government of Rhodesia. Illustrations, Maps and Plans. New York, E. P. Dutton & Co., 1905. 8vo.

JOBSON, RICHARD.—The Golden Trade, or a Discovery of the River Gambra, and the Golden Trade of the Æthiopians. London, 1623. Now reprinted for the first time. Edited by Charles G. Kingsley. Teignmouth, Devonshire. E. E. Speight and R. H. Walpole, 1904. 4to. *Mary H. Kingsley Travel Books, No. 1.*

LAHURE, AUGUSTE.—Lettres d'Afrique: Maroc et le Sahara Occidental. [Portrait, &c.] Bruxelles, Oscar Lamberty, 1905. pr., 8vo.

LENFANT, E.—La Grande Route du Tchad. Mission de la Société de Géographie. [Cartes, Planches, &c.] Paris, Hachette et Cie. 1905. 8vo.

MOREL, EDMUND D.—King Leopold's Rule in Africa. 2 maps, &c. London, W. Heinemann, 1904. 8vo.

RENTY, E. DE.—Les Chemins de Fer Coloniaux en Afrique. 1ère Partie: Chemins de Fer des Colonies Allemandes, Italiennes et Portugaises; 2e Partie: Chemins de Fer dans les Colonies Anglaises et au Congo Belge. (Cartes.) Paris, F. R. de Rudeval, 1903–1904. 2 Tomes. 12mo. [*Gift, from the Author.*]

Steindorff, Georg.—Durch die Libysche Wüste zur Amonsoase. Karte, &c. *Land und Leute, XIX.* Bielefeld und Leipzig, Velhagen und Klasing. 1904. 8vo.

Zelau, Curt v.—Nordafrikanische Touristenfahrten. (Algerien, Tunisien, Tanger.) 35 Abbildungen. Hannover, Gebrüder Jänecke, 1904. pr., 8vo.

AMERICA.

Abbot, Henry L.—Problems of the Panama Canal. (Map and Illustrations.) New York, The Macmillan Co., 1905. 8vo.

Ancona, Eligio.—Historia de Yucatan desde la Época mas remota hasta nuestros dias. Merida, M. Heredia Argüelles, 1878–1880. 4 vols., 8vo.

Baird, S. F., Brewer, T. M. and Ridgway, R.—A History of North American Birds. Land Birds, 3 vols. Illustrated. Boston, Little, Brown & Co., 1874. 4to.

Clavijero, Francisco Javier.—Historia Antigua de Mexico y de su Conquista, &c. Traducida del Italiano por J. Joaquin de Mora. [Maps and Plates.] Mexico, Imp. de Lara, 1844. [2 vols. in 1.] 8vo.

Clavijero, Francisco Javier.—Historia de la Antigua ó Baja California. Obra Postuma. Traducida del Italiano por el presbitero don Nicolas García de San Vincente. Méjico, Juan R. Navarro, 1852. 8vo.

Ferry, Hypolite.—Description de la Nouvelle Californie, &c. Avec une grande Carte, &c. Paris, L. Maison, 1850. 16mo.

Figueroa, Francisco de.—Relación de las Misiones de la Compañia de Jesús en el Pais de los Maynas. *Colección de Libros y Documentos referentes á la Historia de América, Tomo 1.* Madrid, Victoriano Suárez, 1904. 8vo.

Garcia y Garcia, José Antonio.—Relaciones de los Vireyes del Nuevo Reino de Granada, ahora Estados Unidos de Venezuela, Estados Unidos de Colombia y Ecuador. Nueva York, Hallet & Breen, 1869. 8vo.

[Guiana.] Marcus, Willy.—Choiseul und die Katastrophe am Kouroufiusse. Mit einer Kartenskizze. Breslau, M. und H. Marcus, 1905. pr., 8vo.

Gutiérrez de Santa Clara, Pedro.—Historia de las Guerras Civiles del Perú (1544–1548) y de Otros Sucesos de las Indias. Tomos 1–2. *Colección de Libros y Documentos Referentes á la Historia de América, Tomos II, III.* Madrid, Victoriano Suárez, 1904. 8vo.

Hawks, Francis L.—History of North Carolina. With Maps and Illustrations. Vol. I, 1584–1591; Vol. II, 1663–1729. Fayetteville, E. J. Hale & Son, 1857–1858. 8vo.

Hulbert, Archer Butler.—Historic Highways of America, Vol. 16; Index. Cleveland, The Arthur H. Clark Co., 1905. 16mo.

Middendorf, E. W.—Peru. Band 1: Lima; Band 2: Das Küstenland von Peru; Band 3: Das Hochland von Peru. Textbildern, Tafeln und Karten. Berlin, Robert Oppenheim (Gustav Schmidt), 1893–1895. 3 vols., 8vo.

Morice, A. G.—History of the Northern Interior of British Columbia, formerly New Caledonia. 1660 to 1880. Map, &c. 2nd Ed. Toronto, William Briggs, 1904. 8vo.

Petitot, Emile.—Exploration de la Région du Grand Lac des Ours. (Fin des Quinze ans sous le Cercle Polaire.) Gravures et 2 cartes. Paris, Téqui, 1893. 12mo.

[Shipwrecks.] Awful Calamities; or, the Shipwrecks of December, 1839, ... Hurricanes of Dec. 15, 21 and 27, on the Coast of Massachusetts. Etc., etc. Boston, J. Howe, 1840. pr., 8vo.

[SHIPWRECKS.] DIARY OF THE WRECK OF H. M. S. CHALLENGER on the Western Coast of South America, in May, 1835. Etc., etc. (4 Plates.) London, Longman, Rees, Orme, Brown, Green and Longman, 1836. 8vo.

SINGLETON, ESTHER.—Social New York under the Georges, 1714–1776. Illustrated. New York, D. Appleton & Co., 1902. 8vo.

SPENCER, J. W.—The Duration of Niagara Falls, and the History of the Great Lakes. (9 maps, &c.) 2nd Ed. New York, Humboldt Publishing Co. (1894). 8vo.

THWAITES, REUBEN GOLD, *Editor.*—Early Western Travels, 1748–1846. A Series of Annotated Reprints, ... Vol. 1: Journals of Conrad Weiser (1748), George Croghan (1750–1765), Christian Frederick Post (1758), Thomas Morris (1764). (Portrait.) Cleveland, The Arthur H. Clark Co., 1904. 8vo.

WETMORE, ALPHONSO.—Gazetteer of the State of Missouri, with a map of the State. Frontispiece. St. Louis, C. Keemle, 1837. 8vo.

ASIA.

BRASS, EMIL.—Nutzbare Tiere Ostasiens. Pelz- und Jagdtiere, Haustiere, Seetiere. Neudamm, J. Neumann, 1904. pr., 8vo.

CANTON GUIDE, The. Compiled by Dr. Kerr. [Plan, &c.] 2nd Ed. Hongkong, Kelly & Walsh, 1880. pr., 8vo.

COCHRANE, HENRY PARK.—Among the Burmans. A record of fifteen years of work and its fruitage. Illustrated. New York, Fleming H. Revell Co. (1904). 8vo.

CODRINGTON, R. H.—The Melanesians: Studies in their Anthropology and Folk-Lore. Illustrations (and map). Oxford, The Clarendon Press, 1891. 8vo.

HAJI KAHN AND SPARROY, WILFRED.—With the Pilgrims to Mecca. The Great Pilgrimage of A. H. 1319; A.D. 1902. With Introduction by Prof. A. Vambéry. (Illustrations.) London, John Lane, 1905. 8vo.

HAVRET, HENRI.—La Stèle Chrétienne de Si-Ngan-Fou. Ière Partie: Fac-Similé de l'Inscription Syro-Chinoise; IIème Partie: Histoire du Monument; IIIème (avec la collaboration du P. Louis Cheikho) Commentaire Partiel et Pièces Justificatives. (Illustrations.) Chang-Hai, Imp. de la Mission Catholique, 1895–1902. 8vo. *Variétés Sinologiques, Nos. 7, 12, 20.*

LANDON, PERCEVAL.—The Opening of Tibet. An Account of Lhasa and the Country and People of Central Tibet and of the . . . . Mission sent there by the English Government, 1903–4. (Illustrations.) New York, Doubleday, Page & Co., 1905. 8vo.

LOTI, PIERRE.—Les Derniers Jours de Pékin. Paris, Calmann Lévy (1901). 16mo.

MONTGELAS, PAULINE GRÄFIN.—Ostasiatische Skizzen. [Frontispiece.] München, Theodor Ackermann, 1905. pr., 16mo.

MUNZINGER, CARL.—Japan und die Japaner. Stuttgart, D. Gundert, 1904. pr., 16mo.

PERCY, EARL.—Highlands of Asiatic Turkey. (2 maps, &c.) London, Edward Arnold, 1901. 8vo.

PHILIPPINE ISLANDS, CENSUS OF THE. Taken under the Direction of the Philippine Commission, 1903. 4 vols. Vol. 1: Geography, History and Population; Vol. 2: Population; Vol. 3: Mortality, Defective Classes, Education, Families and Dwellings; Vol. 4: Agriculture, Social and Industrial Statistics. (Maps and Illustrations.) Washington, U. S., Bureau of the Census, 1905. [*Gift, from the Department of Commerce and Labor, Washington.*]

PHILIPPINE ISLANDS, 1493–1898.—Explorations of Early Navigators, &c., as related in contemporaneous Books and MSS. Translated from the Originals. Edited, &c., by Emma Helen Blair and James Alexander Robertson. With maps, &c. Vols. XXII, XXIII. Cleveland, A. H. Clark Co., 1905. 8vo.

RATHGEN, KARL.—Die Japaner und ihre wirtschaftliche Entwickelung. Leipzig, B. G. Teubner, 1905. 16mo.

REIN, J. J.—Japan nach Reisen und Studien im auftrage der K. Preuss. Regierung Dargestellt. 1ter Band: Natur und Volk des Mikadoreiches. Abbildungen, Tafeln und Karten. Zweite, neu bearbeitete Auflage. Leipzig, Wilhelm Engelmann, 1905. 8vo.

SANDBERG, GRAHAM.—The Exploration of Tibet. Its History and Particulars from 1623 to 1904. (Map and Plan.) Calcutta, Thacker, Spink and Co., 1904. 8vo.

UNGARD, ALBERT.—Der Suezkanal. Seine Geschichte, seine Bau- und Verkehrs-Verhältnisse und seine Militärische Bedeutung. 6 Kartenbeilagen. Wien und Leipzig, A. Hartleben, 1905. pr., 8vo.

WADDELL, L., AUSTINE.—Lhasa and its Mysteries: with a record of the Expedition of 1903–1904. Maps, &c. London, John Murray, 1905. 8vo.

EUROPE.

CORNET, J.—Études sur l'Évolution des Rivières belges. *Extrait des Annales de la Société géologique de Belgique, t. XXXI, Mémoires.* Liège, H. Vaillant-Carmanne, 1904. pr., 8vo. [*Gift from the Author.*]

CORNET, J.—Excursions de Géographie Physique en Flandre et en Hainaut. (*Extrait du Bulletin de la Société Royale Belge de Géographie, 1904.*) Bruxelles, Vanderauwera & Cie., 1904. pr., 8vo. [*Gift, from the Author.*]

CRANE, THOMAS FREDERICK.—Italian Popular Tales. Boston, Houghton, Mifflin & Co., 1885. 8vo.

DEMANGEON, ALBERT.—La Picardie et les Régions Voisines: Artois, Cambrésis, Beauvaisis. (Planches, Cartes, &c.) Paris, Armand Colin, 1905. 8vo.

FIRTH, J. B.—Highways and Byways in Derbyshire. Illustrations by Nelly Erichsen. (Maps.) London, Macmillan and Co., 1905. 8vo.

FLOREZ, HENRIQUE.—España Sagrada: Theatro Geographico-Historico de la Iglesia de España, origen y estado antiguo de todas sus Provincias, etc., continuado por Manuel Risco. [Many maps and plates.] Madrid [various publishers], 1754–1866. 50 vols. in 25. 8vo.

FRANCE, NORTHERN. From Belgium and the English Channel to the Loire, excluding Paris and its Environs. 4th Edition. 13 maps, 40 plans. Leipzig, Karl Baedeker, 1905. 16mo.

GROLL, MAX.—Der Oeschinensee im Berner Oberland. Mit 2 Karten, einer Tafel und 9 Figuren. (*Jahresberichte der Berner geograph. Gesellschaft, XIX.*) Bern, Haller'sche Buchdruckerei, 1904. pr., 8vo. [*Gift, from the Author.*]

LAKES, ALPINE AND ITALIAN, Upon the Origin of, and upon Glacial Erosion. By Sir A. C. Ramsay, Sir John Ball, et al. With Introduction and Notes upon the American Lakes by J. W. Spencer. [Sketch maps, &c.] New York, Humboldt Publishing Co. [1890?]. 8vo.

LÖFFLER, E.—Dänemarks Natur und Volk. Eine geographische monographie. 39 Illustrationen und Karten. Kopenhagen, Lehman & Stages, 1905. pr., 8vo.

PASSARGE, L.—Dalmatien und Montenegro. Leipzig, B. Elischer Nachfolger [1904?]. 8vo.

[PUTNAM, J. BISHOP.] A Norwegian Ramble. By one of the Ramblers. (Illustrations.) New York, G. P. Putnam's Sons, 1904. 12mo.

SENNETT, A. R.—Across the Great Saint Bernard. Illustrations. London, Bemrose & Sons, 1904. 8vo.

SMITH, F. BERKELEY.—Budapest: The City of the Magyars. Illustrations by the Author. New York, James Pott & Co., 1903. 8vo.

STARKE UND SCHÖNFELDER.—Grosses Ortslexikon des Deutschen Reiches. u. s. w. Mit einer Eisenbahnkarte. Dresden, Gerhard Kühtmann, 1904. 4to.

STEDMAN, EDMUND C., AND STEDMAN, THOMAS L.—Complete Pocket Guide to Europe. [5 maps, 4 plans.] New York, Wm. R. Jenkins, 1905. 16mo.

TYNDALE, JOHN WARRE.—The Island of Sardinia, including pictures of the manners and customs of the Sardinians, &c. (Map, &c.) London, Richard Bentley, 1849. 3 vols., 12mo.

VILLARI, PASQUALE.—Barbarian Invasions of Italy. Translated by Linda Villari. Frontispieces and Maps. London, T. Fisher Unwin, 1902. 2 vols., 8vo.

MAPS AND ATLASES.

AMERICA, MAPS ILLUSTRATING EARLY DISCOVERY AND EXPLORATION IN, 1502–1530.—Reproduced by Photography from the Original MSS. Issued under the Direction of Edward Luther Stevenson. No. 8: Wolfenbüttel-Spanish, 1525–30. (4 sheets.) New Brunswick, N. J., 1905. Portfolio.

BOHEMIA. Sprachenkarte von Böhmen. Von Dr. Heinrich Rauchberg. *Scale:* 1:500,000=7.8 miles=1 inch. Mit 4 Eckkartons. *Scale;* 1:200,000=3.1 miles=1 inch. Wien, R. Lechner (Wilh. Müller) (1904). *Size:* 26½ x 22 inches. *Folded in 8vo case, with 4 pp. text.*

PERU, ATLAS DEL.—Por L. A. Jouanny. [13 maps, xvi pp. text.] Lima, P.V. Jouanny, 1867. Folio.

TIBET AND THE SURROUNDING REGIONS. Compiled from the latest information, corrected to 1904. Drawn by H. Sharbau. *Scale:* 69 miles=1 inch. *Size:* 25 x 17¼ inches. London, Royal Geographical Society, 1904. Coloured.

UNITED STATES AND CANADA.—Disturnell's New Map. Drawn by Henry A. Burr. *Scale:* 62 miles=1 inch. *Size:* 39 x 27¾ inches. New York, J. Disturnell, 1850. Engraved. Colored by hand.

POLAR.

ARCTIC GEOGRAPHY AND ETHNOLOGY, Selection of Papers on. Reprinted, and presented to the Arctic Expedition of 1875 by the Royal Geographical Society. (2 maps.) London, John Murray, 1875. 8vo.

BERNACCHI, LOUIS.—To the South Polar Regions. Expedition of 1898–1900. (3 charts, &c.) London, Hurst and Blackett, 1901. 8vo.

DRYGALSKI, ERICH VON.—Zum Kontinent des eisigen Südens. Deutsche Südpolarexpedition . . . "Gauss," 1901–1905. Abbildungen, Tafeln und Karten. Berlin, Georg Reimer, 1904. 4to.

NANSEN, FRIDTJOF, *Editor.*—The Norwegian North Polar Expedition, 1893–1896: Scientific Results, Vol. VI. [XX Plates.] Christiania, Jacob Dybwad; London, et al., Longmans, Green & Co., 1904. 4to. [*Gift, from the Council of the Fridtjof Nansen Fund.*]

VARIOUS.

AMERICANISTS, INTERNATIONAL CONGRESS OF. 13th Session, New York, 1902. Easton, Pa., Eschenbach Print, 1905. 8vo.

BADEN-POWELL, B. F. S.—In Savage Isles and Settled Lands: Malaysia, Australasia and Polynesia. 1888–1891. (5 maps, and Illustrations.) London, R. Bentley & Son, 1892. 8vo.

[BIBLIOGRAPHY.] ENGLISH CATALOGUE of Books for 1904. 68th Year of Issue. London, Sampson Low, Marston & Co., 1905. 8vo.

BIBLIOGRAPHY. EVANS, CHARLES.—American Bibliography. Vol. II, 1730–1750. Chicago, Privately printed for the Author. Blakely Press, 1904. 4to.

[BIBLIOGRAPHY.] KIRCHHOFF, ALFRED, UND REGEL, FRITZ.—Bericht über die neuere Literatur zur deutschen Landeskunde. Bd. II (1900 und 1901). Breslau, Ferdinand Hirt, 1904. 8vo.

[BIBLIOGRAPHY.] SOBOLEWSKI, SERGE.—Catalogue de la Collection de Livres Anciens et Modernes formant la Bibliothèque du Feu M.———. Leipzig, List und Francke, 1873. 8vo.

BOCKELMANN, ALBRECHT VON.—Wirtschaftsgeographie von Niederländisch Ost-Indien. *Angewandte Geographie, 2. Serie, 2. Heft.* Halle a. S., Gebauer-Schwetschke Druckerei und Verlag, 1904. pr., 8vo.

BOMAN, ERIC.—Migrations Précolombiennes dans le nord-ouest de l'Argentine. [Illustrations.] *Extrait du Journal de la Société des Américanistes de Paris, Nouv. série, Tome II, nº 1.* (Paris), Au Siège de la Société, 1905. pr., 8vo. [*Gift, from the author.*]

CALLEGARI, G. V.—Pitea di Massilia. [Plate.] *Estratto dalla Revista di Storia Antica: Anno VII, 4; Anno VIII, 2; Anno IX, 2.* Feltre, Tip. Panfilo Castaldi, 1904. pr., 8vo. [*Gift, from the Author.*]

COOLIDGE, W. A. B.—Josias Simler et les Origines de l'Alpinisme jusqu'en 1600. Avec illustrations et Carte. Grenoble, Allier Frères, 1904. 8vo.

DARWIN, CHARLES.—Formation of Vegetable Mould, through the action of earth worms, with observations of their habits. [Illustrated.] New York, Humboldt Publishing Co. [1881]. 8vo.

DETLEFSEN, D.—Die Entdeckung des germanischen Nordens im Altertum. *Quellen und Forschungen zur alten Geschichte und Geographie, Herausgegeben von W. Sieglin, Heft 8.* Berlin, Weidmannsche Buchhandlung, 1904. pr., 8vo.

DICTIONARY, RUSSIAN-ENGLISH AND ENGLISH-RUSSIAN. By A. Alexandrow. 3rd Edition, revised and enlarged. [St. Petersburg, General Staff.] 1899, 1904. 2 vols. 8vo.

[DICTIONARY.] SIPIBO, DICCIONARIO.—Castellano–Deutsch–Sipibo. Abdruck der Handschrift eines Franziskaners mit Beiträgen zur Kenntnis der Pano-Stämme am Ucayali. Herausgegeben von Karl von den Steinen. Berlin, Dietrich Reimer (Ernst Vohsen), 1904. pr., 8vo.

[DICTIONARY, SWEDISH.]—Svensk–Engelsk Ordbok, C. G. Björkman; Engelsk–Svensk Ordbok [2d Ed.], Edmund Wenström och Erik Lindgren. Stockholm, P. A. Norstedt & Söners (1889, 1895). 2 vols. 8vo.

DWIGHT, HENRY OTIS, *Editor.*—Blue Book of Missions for 1905. New York, Funk and Wagnalls Co., 1905. 12mo. [*Gift, from the Editor.*]

ENCYCLOPEDIA, JEWISH.—Vols. IX and X. *Illustrated.* New York and London, Funk & Wagnalls Co., 1905. 8vo.

ESQUEMELING, JOHN.—The Buccaneers of America, &c., &c. (Reprinted from the Edition of 1684, to which is added . . . the very scarce Fourth Part, by Basil Ringrose, &c. Edited, with Introduction, by Henry Powell.) (8) facsimiles (including maps). London, Swan Sonnenschein & Co, 1893. 8vo.

FABRE, J. H.—Souvenirs Entomologiques. (Neuvième Série.) Études sur l'instinct et les mœurs des insectes. [Illustrations.] Paris, Ch. Delagrave [1904?]. 8vo.

FITZNER, RUDOLF.—Deutsches Kolonial-Handbuch. 2. erweiterte Auflage. [With maps.] Band 1. und 2., 1901, Ergänzungsband 1904. Berlin, Hermann Paetel. 3 vols. 8vo.

[FOLK-LORE.] FISON, LORIMER.—Tales from Old Fiji. (Map and Illustrations.) London, Alexander Moring, 1904. 8vo.

FOLK-LORE SOCIETY, London.—Publication IX [comprising]: COMPARETTI, DOMENICO.—Researches respecting the book of Sindibâd; PEDROSO, CONSIGLIERI. [Collector].—Portuguese Folk-Tales. Translated from the original MS. by Miss Henriqueta Monteiro. London, Elliot Stock, for the Folk-Lore Society, 1882. 8vo.

GEIKIE, ARCHIBALD.—Landscape in History and Other Essays. London, Macmillan and Co., 1905. 8vo.

HAACK, HERMANN.—Geographen-Kalender. 3ter Jahrgang, 1905/1906. Bildnis und 16 Karten. Gotha, Justus Perthes, 1905. 16mo.

HARFORD, CHARLES FORBES.—Hints on Outfit for Travellers in Tropical Countries. London, Royal Geographical Society, 1903. 16mo.

IRELAND, ALLEYNE.—The Far Eastern Tropics. Studies in the Administration of Tropical Dependencies. [Map.] Boston and New York, Houghton, Mifflin & Co., 1905. 8vo.

JOÛBERT, JOSEPH.—Stanley: Le Roi des Explorateurs, 1840–1904. [With portrait.] Angers, Germain et G. Grassin, 1905. pr., 8vo. [*Gift, from the Author.*]

KELTIE, J. SCOTT, AND RENWICK, I. P. A. (*Editors*).—The Statesman's Year Book, 1905. 42d Year. London, Macmillan & Co., 1905. 8vo.

LANE-POOLE, STANLEY.—Saladin and the Fall of the Kingdom of Jerusalem. (3 maps, plans, etc.) New York, G. P. Putnam's Sons, 1903. 12mo. *Heroes of the Nations Series.*

LONDON MISSIONARY SOCIETY.—Reports: 21st to 26th, 1815–20; 44th to 46th, 1838–40. London, Williams & Son, William Tyler et al. 2 vols. 8vo.

LOUDON, J. C.—Arboretum et Fruticetum Britannicum; or, the Trees and Shrubs of Britain, &c., &c. London, Longman, Orme, Brown, Green & Longmans, 1838. 8vo. 4 vols. Text and 4 of Plates.

MARTIN, FREDERICK.—The History of Lloyd's and of Marine Insurance in Great Britain. With an Appendix containing Statistics. London, Macmillan & Co., 1876. 8vo.

PORREÑO, BALTASAR.—Dichos y Hechos del Señor Rey Don Felipe Segundo, el Prudente, Potentissimo y glorioso Monarca de las Españas, y de las Indias. En Madrid, Viuda de Juan Sanchez, 1639. 8vo, *vellum.*

REEVES, E. A.—Trigonometry, Plane and Spherical. With the investigation of some of the more important formulæ of practical Astronomy and Surveying. [Figures and Diagram.] London, Royal Geographical Society, 1904. 8vo.

VALENTINE, E. SETON, AND TOMLINSON, F. L.—Travels in Space. A History of Aerial Navigation. Illustrated. New York, Frederick A. Stokes Co. (1902). 8vo.

[VOLCANOES.] LACROIX, A.—La Montagne Pelée et ses Eruptions. Ouvrage publié par l'Académie des Sciences sous les auspices des Ministères de l'Instruction Publique et des Colonies. (30 Planches.) Paris, Masson et Cie, 1904. 4to.

[VOLCANOES.] LOCK, W. G.—Askja, Iceland's largest Volcano; with a description of the great Lava Desert in the Interior, &c. [Map.] Charlton, Kent., Published by the Author, 1881. 8vo.

[VOLCANOES.] SAPPER, KARL.—In den Vulcangebieten Mittelamerikas und Westindiens. Abbild., Tafeln (u. Karten). Stuttgart, E. Schweizerbart: (E. Nägele), 1905. 8vo.

ZOOLOGY OF CAPTAIN BEECHEY'S VOYAGE. Compiled from the Collections and Notes made by Capt. Beechey [et al.] during a Voyage to the Pacific and Behring's Straits . . . 1825–'28. By J. Richardson, and others. Coloured Plates. London, Henry G. Bohn, 1839. 4to.

BOOK NOTICES.

Historia de las Guerras Civiles del Perú (1544–1548) y de Otros Sucesos de las Indias, por Pedro Gutierrez de Santa Clara. Tomos 1 y 2. (Colección de Libros y Documentos referentes á la Historia de América.) Victoriano Suárez, Madrid, 1904.

The veritable title given by Pedro Gutierrez de Santa Clara to his five books, only two of which are as yet published, is: "*Quinquenarios*, and he qualifies the civil wars in Perú as "*guerras mas que ciuiles que uvo en los reynos y prouincias del Perú.*" It might have been more appropriate to apply to these disturbances the epithet of "less than civil." As it is, there are as yet only two books of this interesting work in print, and it is enough to make us yearn for the rest. To review the *beginning* of a work is a very delicate task.

Many, and quite important, matters are foreshadowed in that beginning. We learn, from references in the elaborate introduction, that the third, the fourth, and especially the fifth book contain the most interesting, or, at least, the most attractive data. Some conclusions of the introduction are held in suspense, as we have not the final word of proof which the unprinted sections contain. At any rate, the remaining volumes, it is to be hoped, will soon make their appearance, and until then it is a pleasant duty to congratulate the Spanish editor on what he has attempted and performed. He has opened to study a new source on the history of the colonization of Peru in its earliest period, and it may be also a valuable contribution to the knowledge of primitive conditions. This, as well as the importance of the work for Mexico, remains yet to be seen.

Very naturally, the person of the author, *who* and *what* he was, occupies a great portion of the introduction. It is not easy to find a needle in a haystack, and therefore, where men called *Gutierrez* abound, and each one of them is adorned with as little genealogy as possible, the pedigree of one of them named Pedro is hard to trace. The editor has, therefore, attached himself to the appendix *Santa Clara*, in

the hope of finding some clue among those Spaniards who were in America at the time and bearing that name. That our Pedro was not born in Spain, but in the new continent, seems certain. He says this himself. But while Santa Clara may have been his father's name, the thought should not be discarded of Santa Clara having been the name of his *mother*, and her *maiden name*, too. There are many such instances on record when the maternal appellative was substituted for the paternal without the usual "y" being interjected. Witness, for instance, Alvar Nuñez Cabeza de Vaca, Castillo, Maldonado, and many others of the time. On this point it is, however, useless to dwell at length, since the material furnished by the two volumes is not sufficient. Suffice it to know that Gutierrez claims to have been present at most of the occurrences related by him, which makes of his writings a source of high respectability.

There is, however, a wide step from this deserved acknowledgment to the sweeping assertion made by the editor, that the work of Gutierrez de Santa Clara is the *only one* written on the subject by an eyewitness. This statement might be pardonable coming from a reviewer, or some so-called historian on our side of the water, but from a Spaniard of learning, like the editor, it is very surprising. If Pedro Gutierrez was the "only" eyewitness of the "more than civil wars" in Peru, where was Agustin de Zárate at the time? Where Pedro Pizarro? or Alonzo de Montemayor, whose narrative Oviedo carefully preserved and rendered? Where was Nicolas de Albenina, whose little book exists, if in but a single copy, at Paris? All these men were in Peru at the time, and took part in the very "uncivil" disturbances of the period. Zárate was one of the highest of royal officers, and Montemayor also occupied a position much above that of any private soldier, like Cieza or Gutierrez, and they were able to look at events from a much higher level. The "Quinquenarios" are an invaluable check upon the statements of these sources, but only a check, and not the final word, the source *par excellence*. If Gutierrez is an indispensable check on the writings of his contemporaries they are the same to his, and the German proverb should be taken as a rule in every historical undertaking:

> "Eines Mannes Rede, ist keines Mannes Rede;
> "Man muss sie hoeren Alle Beede."

It is certain that Gutierrez, as far as we are able to judge, is a very loquacious writer of minute details. Yet he is not a gossiper. And he tries as hard as he can to be impartial, in spite of his unflinching adherence to the cause of the Crown. It was not easy, under the circumstances, to be faithful in deeds and impartial in opinion. Gutierrez, for instance, gives a picture of Blasco Nuñez de Vela, the stiff-necked executor of the laws, framed under the influence of the fanatics, and impracticable as Casas, which is inestimable for truth and actuality. He paints with a master hand that man, imbued with but one idea and deaf to all counsels of prudence, driven to murder by his own blindness, and finally rushing into his well-merited destruction. So far as we can judge, his portrait of Gonzalo Pizarro will not be as good, and for two reasons; he had not, with Pizarro, the same contact as with Nuñez de Vela, and he was on the king's side. In this, again, we must wait for the closing volumes before expressing a final opinion.

Whereas most authors of his time on America introduce their narrative with at least a few geographic data, we look in vain for such in Gutierrez. Neither is there anything of great geographic importance in the two volumes. He begins his story with a brief biographic reference to Las Casas, and what he says concerning that inconsiderate zealot's attempt at Cumaná is very true. He justly recognizes in Las

Casas the source of all the evil that flooded Perú in the middle of the sixteenth century, and the greatest enemy the Indians ever had. He does not say this in so many words, but he leaves the reader to understand it from the facts related.

The absence of geographical information applies only to the two volumes before us. From references to the three volumes that will follow we conclude that especially the last (fifth) book will make up for the deficiency. Let us hope that the remainder of the work may soon appear in print.

The typography is commendable. The samples of the handwriting (two of which are of a geographic nature, and give a fair idea of the settlements along the western coast of America, north and south) are quite interesting. For his time, Gutierrez wrote a very clear and exceedingly legible hand. It must be said, also, that Gutierrez, after his return to Mexico, continued to work on his narratives, and that they were probably finished only in the first years of the seventeenth century. He also claims to have written a book under the title of *Colloquios*, the whereabouts of which is still unknown.

Let us hope that the publication of ancient texts relative to Spanish America, in which work Spain is justly foremost, will give us at last some of the more important manuscripts which are still unpublished. There exists, for instance, in private hands at Madrid, the third part of the Chronicle of Cieza, which is invaluable for Peru and its primitive condition. The *Epítome del Nuevo Reyno de Granada*, by the conqueror, Gonzalo Jiminez de Quesada, written in 1539, also exists in the Archives of Madrid. So does the remarkable description of Peru, as far as the jurisdiction of Almagro extended, in 1539, by Father Cristóval de Molina. The time for "Columbiana" is about over; they have ruled long enough. Let Americana of the sixteenth century have their chance also, to be presented to the student in an accurate and accessible form, as they have always come to us from Spain.

A. F. B.

Il Tibet (Geografia, Storia, Religione, Costumi) secondo la Relazione del Viaggio del P. Ippolito Desideri (1715-1721). By Carlo Puini. lxiv and 402 pages, Appendices and Index. Italian Geographical Society, Rome, 1904.

Prof. Carlo Puini rediscovered, in 1875, the long-forgotten manuscript "Ragguaglio," in which the Jesuit Father Desideri gave a description of his travels and missionary work in Persia, Kashmir, the Moghul Empire and Great and Little Tibet, in the early part of the eighteenth century. He lived for six years in Lhasa—a longer time than any other European has ever spent there. The manuscript was rediscovered at Pistoia in the library of Cavaliere Rossi-Cassigoli, who, however, refused to permit Prof. Puini to publish the valuable document, as he hoped to sell it to the Hakluyt Society, to be published in English. This arrangement was not completed, however—perhaps on account of the death of the owner. It was not till 1901 that the Italian Geographical Society gave assistance that enabled Prof. Puini to publish a part of the work.

The portion now printed is confined to the sections on Tibet; is a little less than half of the manuscript, and the more valuable part of it. Nearly half of the book deals with Tibetan Buddhism and Lamaism, with the strange religious systems that preceded them. As all other matters relating to Tibet are now better understood than the religions that for many ages enchained it and stifled all progress, the account that Desideri wrote of them, qualified as he was by intellectual equipment and thorough acquaintance with the Tibetan language, will be especially valuable to students of this phase of Asiatic history.

A Norwegian Ramble. By One of the Ramblers. xi and 232 pp. and 16 half-tone illustrations. G. P. Putnam's Sons, New York, 1904.

A book handsomely printed and convenient for the pocket. It takes the reader away from the beaten paths to the fiords and mountains of southwestern Norway, where the weary may find rest and recreation among innumerable waterfalls, lakes, and snow-crowned heights. The author shows, both with pen and picture, that this region offers extraordinary attractions, and he is very appreciative of the kindly, hospitable and honest folk living amid these surroundings. But if Nature is lavish of her beauty and grandeur, the soil is niggardly:

> Every square yard of ground capable of producing grass is mown twice during the season and infinite care is taken in curing the crop. Everything else that can possibly be used for fodder is also saved with scrupulous economy. Thus the ash trees are shorn of all their lower leaves and branches and the potato tops, when they reach their full growth, are also cut, and both these and the ash leaves are dried upon the hurdles in the same manner as the grass.

The Far Eastern Tropics. Studies in the Administration of Tropical Dependencies in the Far East. By Alleyne Ireland. vii and 339 pp., Statistical and Biographical Appendices, Index and Map. Boston, Houghton, Mifflin & Co., 1905.

Mr. Alleyne Ireland, who has been devoting himself to a study of the forms of government and the conditions of labour in the tropics, and who has already written several articles and at least one book on these general subjects, has now published this volume. He rightly lays much emphasis upon the climatic control of government in the tropics; in fact, his whole discussion may be said to rest upon climatic considerations. The mean annual isotherms of 68°, which are taken as the limits of the heat belt, bound the region in which Mr. Ireland sees a stationary civilization, and not a single contribution of first importance to art, literature, science, manufacture, or invention. The author notes that in early times man did progress within the tropics, but that the real advance has come under more harsh conditions in the so-called "temperate" zone. To quote:

> The history of western civilization is the history of man's emancipation from the tyranny of his surroundings. That of tropical civilization is the record of his enslavement. The significance of this antithesis lies in the fact that, whereas in tropical civilization each succeeding nation, by building up a heritage of increasing weakness and dependence, wrote failure in ever-darkening letters across the page of history, each hour of western civilization marked some advance and yielded to man some new augmentation of his powers.

Mr. Ireland believes that the development of tropical peoples "has reached the limits imposed by inexorable natural laws"; that the greatest success in administering tropical possessions has been attained by those northern nations which realize that the natives of the tropics are and must remain dependent people, who cannot take a controlling part in government patterned after the forms familiar in extra-tropical countries. To expect that the natives of the tropics will become fit for self-government in the Western sense seems to Mr. Ireland "beyond any flight of an imagination which is checked by the smallest knowledge of tropical life."

Doubtless the very decided views taken by Mr. Ireland in his latest book will meet with severe criticism, and doubtless he goes too far in some things. But, on the other hand, climate is a natural control which is extremely powerful, and it is a control which few persons have so far thoroughly appreciated. For a temperate discussion of the influence of climate upon government reference may be made to a paper by Hon. James Bryce in *The Century* for March, 1899 (*British Experience in the Government of Colonies*).

R. DEC. W.

Die Aenderung des Projektionssystems der schweizerischen Landesvermessung. Bern, 1903. 8vo, 117 pp., V tables, and map.

This work has for its underlying object the mathematical presentation of a new system of projection which is adaptable to the construction of the topographic map of Switzerland. In connection with the discussion of the proposition for the introduction of the new system, the principles of the projections that have been developed since the beginning of the nineteenth century, for the purposes of topographical mapping, are set forth; and a summary statement is made of the projections that are employed at the present time in the different countries.

The essential part of the book is that part which is devoted to the development of the principles of the new system of projection under the heading "The oblique axis cylindric-projection with preserved angles, and its application to Switzerland."

Switzerland is of an extent a little less than two degrees in latitude and a little more than four degrees in longitude, as shown by the map which accompanies the work to illustrate the various projection systems which have been applied by that country. The centre or zero point of the projection is taken at Bern, which is in the western central portion of the country. Bessel's dimensions of the terrestrial spheroid are accepted.

Formulæ for the transfer from a spheroidal surface to that of a spherical surface are first developed: The condition that a differential triangle, in being transferred from the spheroid to the sphere with preserved angles, carries with it the further condition that the ratio of any two sides of the triangle of the spheroid equals the ratio of the corresponding two sides when transferred to the sphere; also, on account of the conditions of conformity, the meridians of the spheroid and sphere cut the corresponding parallel circles at right angles, and $\frac{dl}{dL}$ the ratio of the distance between two meridians on the spheroid to the corresponding distance on the sphere is constant and independent of the latitude. Making use of these principals, the required formulæ are deduced.

By these formulæ the latitude and longitude of a position on the sphere are deduced from the latitude and longitude of the corresponding position on the spheroid. Also the azimuth of a line on the sphere is determined from the azimuth of the corresponding line on the spheroid, and the magnification ratio of the length of a great circle arc on the sphere to the length of the geodetic line on the spheroid is found.

After the completion of the transfer from the spheroid to the sphere, formulæ are developed for the purpose of making a further transfer from the sphere to the plane under the restriction that angles are still to be preserved. First, the latitude and longitude of a position on the sphere being assumed, the spherical co-ordinates y and x are determined with reference to the zero meridian and the great circle normal to it through the zero point of the chart. This latter circle is called the base circle. From y, x, the plane co-ordinates y', x' are determined in the oblique axis cylindric-projection system. Conversely y', x' being given, formulæ are derived giving y, x.

The angle formed by a great circle perpendicular to the base circle and a meridian is called the meridian convergence for the point of intersection. This angle is represented in the plane by the angle between the projected meridian through the point and a parallel to the x axis or the projected zero meridian. The value of the meridian convergence is derived in terms of y', x'.

The azimuth reduction and the magnification ratio being deduced, the work closes with some examples applying the method to the transference, first from the spheroid to the sphere, and then from the sphere to the plane. G. W. L.

Thomas Hutchins. A Topographical Description of Virginia, Pennsylvania, Maryland, and North Carolina. Reprinted from the original edition of 1778. Edited by Frederick Charles Hicks. The Burrows Brothers Company, Cleveland, 1904.

Mr. Hicks has made scholarly use of the opportunity which he had for several years as a member of the staff of the Congressional Library. He introduces Hutchins' narrative with an interesting and extended biographical sketch (45 pp.), with many citations of authorities. Hutchins' career was unique in that he alone has held the office of Geographer of the United States. He was born in New Jersey in 1730, and after coming to maturity served more than twenty years as a British officer. He was stationed at Fort Pitt in 1759, and he acted as engineer in various operations and explorations on the frontier, including supervision of public works in Florida and Louisiana.

He was in London at the outbreak of the war with the Colonies. He was imprisoned, being charged with treason, and suffered great financial losses for his unflinching loyalty to the land of his birth. He was held in high regard by such men as Franklin and Washington, and was appointed Geographer to the United States of America in 1781.

Hutchins executed surveys for roads and boundaries, and was engaged in the examination of sites for a national capital. He was one of a commission to run the western part of the boundary between Pennsylvania and Virginia, and thus completed the location of the famous Mason and Dixon's line.

Much honour is ascribed to him for his part in working out methods of dividing the public lands. He conducted many surveys in the western wilderness, and is characterized by the editor as holding a place among "the great American civilizers." The sketch is followed by a list of Hutchins' works and the reprint of the topographical description. In pocket is a reprint of his map, first published in London in 1778, "A new Map of the Western parts of Virginia, Maryland, and North Carolina."

A. P. B.

Dalmatien und Montenegro. Reise und- Kulturbilder. Von L. Passarge. 341 pp. B. Elischer, Leipzig, 1904. (Price, M. 6.)

Like all the earlier travel descriptions by this writer, the book gives a series of entertaining pen-pictures of the regions described. It takes the reader along the short Hungarian shore-line and the coast of Dalmatia to its southernmost point. An excursion inland gives many glimpses of the intérior of Montenegro; and with the pictures and impressions of the present time, the author sketches the past of the same regions, many an old ruin or hoary document helping him to indicate the various stages of culture through which these people have passed. Books like this tend to stimulate travel in the regions described, and assist the visitor to enlarge his understanding of the influences that have shaped the civilization of a country.

Problems of the Panama Canal. By Brig. Gen. Henry L. Abbot, U. S. Army, Retired. xl and 248 pp., Map of the Route, 15 diagrams, Appendix and Index. The Macmillan Company, New York, 1905. (Price, $1.50.)

The book sets forth the views of Gen. Abbot as to the work done on the Panama Canal and what steps should be taken to complete it. As Gen. Abbot was engaged for seven years in a technical study of the Panama problem and dealt with many large public works during his long career in the Engineer Corps of the Army, his opinion on the great enterprise at the Isthmus will command much attention. Of

large geographical interest is his extended treatment of the physical conditions, including climate, concerning which, he says, much wild exaggeration has been circulated, though no one will assert that the climate of the Isthmus is salubrious. He discusses the engineering problems and the various projects for completing the canal. He is not in favour of a sea-level canal, and he says in his final chapter:

> It is the unanimous opinion of all the engineers who have had practical experience in canal work and time to thoroughly study the problem, that no sea-level *projet* without locks, and no sea-level canal even with a tidal lock, is practicable that would be comparable in ease and safety of transit to one equipped with modern locks and planned to take advantage of all the desirable elements which the natural conditions offer.

The Complete Pocket Guide to Europe. Edited by Edmund C. Stedman and Thomas L. Stedman. xxxi and 505 pp., 5 Maps, 4 Plans and Index to Places. William R. Jenkins, New York, 1905.

A new edition of this well-known "handy volume," which may still be carried in a man's pocket, thanks to the determination of the editors to keep it within the original size. It contains much condensed information, without justifying its claim to completeness. In a small book covering so much ground most attractions can merely be pointed out; but there is descriptive matter for the leading show-places. The commonplace railroad map of Europe is not worthy of the book. To specify only one or two of its shortcomings, Constantinople is not named, and the reader might easily get the impression that there is no direct rail communication between St. Petersburg and Warsaw, the third largest city of the Russian Empire.

The East Africa Protectorate. By Sir Charles Eliot. xii and 334 pp., 31 illustrations, 2 Maps, Appendices and Index. Edward Arnold, London, and Longmans, Green & Co., New York, 1905. (Price, $5.)

Sir Charles Eliot was recently Commissioner for this Protectorate, which, roughly speaking, embraces the territory between the Victoria Nyanza and the Indian Ocean. This region is especially noteworthy because it offers opportunities for European colonization under the tropical sun. Until recently, however, knowledge of the country, as a whole, has been fragmentary and inadequate. The appearance of this book, dealing with all its important aspects and written by a former official who is most competent to treat the subject, is an interesting geographical event.

Sir Charles was sceptical as to the reports that there are wide areas perfectly adapted for occupancy by white farmers, until long investigation and experiment proved the statements to be true:

> Much of the territory is still imperfectly known, and even those who have claims to special knowledge are continually surprised by the discovery of new districts, healthy, fertile, and suitable as a residence for Europeans. In this year, though six weeks of it have not yet elapsed, I have received reports of two such districts in parts of the Protectorate which were supposed to be barren, one in the north of the Rift Valley, and one near the western extremity of the German boundary.

The first eight chapters are given to a historical retrospect, a description of the geography of the coast lands, the interior and the remarkable highlands where the conditions favour white colonization, and to a most valuable account of the Swahilis, Somalis, Bantu-speaking and other tribes.

In three chapters devoted to East Africa as a European colony, the author says that the lower parts of East Africa are planters' countries, where Europeans may superintend plantations but cannot reside permanently. The coasts of the African mainland are, with a few exceptions, the best of these districts. The worst parts are the shores of Victoria Nyanza and some swampy places on the coasts.

On the other hand, the Highlands (5,000 to 10,000 feet high) are a region in which the whites may thrive and multiply, as has been proved by the experience of fifteen years. There is now a steady influx of English-speaking settlers, due to the railroad, which makes it easy to reach the highlands. The immigration has been a source of embarrassment, because the settlers arrived before surveys had been made and land laws adopted. These difficulties have not yet been entirely remedied.

The natives must be protected and assured of sufficient land for their needs, but the paucity of native population simplifies the question of white immigration. Sir Charles describes the existing system of administering the Protectorate, suggests methods of improving the Government, and supplies chapters on the railroad between Mombasa and Uganda, commerce, slavery, missions, and a journey down the Nile, the whole forming a comprehensive and valuable account of a region that until 21 years ago had never been crossed by a white man.

Relación de las Misiones de la Compañía de Jesús en el País de los Maynas. Por el P. Francisco de Figueroa. Madrid, Victoriano Suárez, 1904. (Colección de Libros y Documentos referentes á la Historia de América. Tomo I.)

After the publication, by the Peruvian Government and in the "*Revista de Archivos y Bibliotecas nacionales*" (Sept. to last of Dec., 1899), of the documents relative to the reduction and pacification of the forest Indians on the Peruvian side of the upper Amazon, between the years 1643 and 1659, this volume on the Missions of the Marañon appears timely. It completes the former. The appendix, furthermore, contains three documents which bring down information on these Missions to the year 1738, at least. Together with the works published before in Spain (or rather reprinted), like that of Father Cristóval de Acuña from 1641, the "*Nuevo Descubrimiento del rio de Marañon, etc.*," by the Franciscans Fr. Laureano de la Cruz and Fr. Juan de Quincocos, written in 1653, and the valuable documents which the late Don Marcos Jiménez de la Espada published in Vol. IV of his "*Relaciónes geográficas de Indias*," it nearly completes the set of principal sources on missions and explorations of that wild and barely penetrable region in which the Jesuits performed their monumental labours among the South American aborigines, not to omit, as belonging to the same kind of literature, what is preserved about the work of Father Samuel Fritz, S.J., in the "*Lettres édifiantes et curieuses*" and the "*Newe Weltbott*" of Father Strecklein.

Not saying it in disparagement of other Orders, it must be conceded that geography owes a special debt of gratitude to the old Jesuit missionaries. We take geography in the widest sense of the term, as embracing Natural History and Anthropology. This is well exemplified, again, in the "*Relación*" of Father Figueroa, particularly in Nos. XII to XXII, which furnish a description of the region and what it contains. The value of the specific training received by the members of the "Company of Jesus," after individual inclinations and aptitudes have been thoroughly probed and developed, is placed in proper relief through such narratives. We, of course, meet, now and then, with misstatements, with utterly unfounded stories; but no blame can be attached to the devoted priests for repeating the errors of their time. The picture of the aborigines is far from appealing to our sympathies, and one can but pity, and admire at the same time, the untiring missionaries. A most valuable contribution is the minute location of tribes or bands in the middle of the seventeenth century; and, while the (unostentatious) narratives of vicissitudes are necessarily prolix, and religious enthusiasm is strongly prominent, these very *faits et gestes*

impart a wealth of geographic information. Thus the exceedingly complicated network of water-courses on the north side of the Marañon has much and new light thrown upon its confused and entangled channels by the simple story of the monks' peregrinations; on water (paddling up or down the numberless streams), or on land by cutting their way across from river to river, through the almost impenetrable forest. This applies as well to the documents forming the appendix, written in the same spirit, and imparting information of the same nature.

Of the introduction not much need be said. It fits the subject, and, while not complete in its bibliography, is still fairly ample. The editors and publishers can but be congratulated on the issue of such interesting and hitherto hardly accessible matter bearing upon South American topics and upon regions the industrial importance of which is becoming gradually recognized. A. F. B.

Deutsches Kolonial-Handbuch. Nach amtlichen Quellen bearbeitet von Dr. Rudolf Fitzner. Vol. I (Second Edition), viii and 412 pp., 8 Maps and Index, 1901; Vol. 2 (Second Edition), iv and 267 pp., 2 Maps and Index, 1901; with Ergänzungsband, 1904. Hermann Paetel, Berlin. (Price, M. 8 for the three volumes.)

In Germany, a standard work of reference relating to the colonies. The two initial volumes give much detailed and carefully-compiled information relating to the geography, government, trade, commercial and planting companies, and other features of each of the German colonies. Supplementary numbers bring the information down to date without reprinting the general facts of more or less permanent value. Among the various kinds of information are the names, residence, and occupation of all colonists and officials.

Among the Burmans. A Record of Fifteen Years of Work and its Fruitage. By Henry Park Cochrane. 281 pp., and 19 Illustrations from Photographs. Fleming H. Revell Company, New York and Chicago, 1905.

Dr. Cochrane has endeavoured to give a true picture of life and conditions in Burma. He describes the first impressions and experiences of the foreigner, the every day life of the natives, their customs, religion and races, the obstacles in the way of development from the Western point of view, and the progress of missionary effort. Anecdotes and concrete illustrations give vividness to the narrative, and the style is entertaining. Of the difficulties of acquiring the Burmese language the author says:

> The construction of a Burmese sentence is the reverse of the English order. Many sentences may be translated backward, word for word, certain connecting particles becoming relative pronouns, with a perfect idiomatic English sentence as the result. The eye can soon be trained to take in a printed sentence as a whole and grasp its meaning without stopping to render it into English in the reversed order. But to keep this order in mind, in conversation, with the word expressing action left for the last, like the snapper to a whip, is not so easy.

The long chapter on the chief races gives the characteristics and an outline of the history of each of the peoples. The book, though written from the missionary standpoint, is a good, popular account of the country and its inhabitants.

The Exploration of Tibet. Its History and Particulars from 1623 to 1904. By Graham Sandberg. vi and 324 pp., Map of Tibet and Plan of Lhasa (in pocket) and Index. Thacker, Spink & Co., Calcutta, and W. Thacker & Co., London, 1904.

When Mr. Clements R. Markham published in 1876 his narratives of the mission

of Bogle to Tibet and the journey of Manning to Lhasa, he also collected for the volume all that was known of the geography of that country and of the geographical work done there up to that time. This well-known work has since then been the best book of reference in matters relating to Tibet for the period covered. Mr. Sandberg's book not only supplements Markham's volume for the later years, but also remedies its deficiencies by the use of material that existed, but was not accessible, when Markham wrote.

The book is a concise exposition of the geography and exploration of Tibet from the travellers of the Middle Ages (who brought news of the country, though they did not enter it) to the British expedition of last year. The author had special advantages for treating such phases of the work as the explorations of the Indian surveyors; and he gives more space than has hitherto been done in English to narratives of travel that are least known to the public, such as the annals of the Capuchin missions of the eighteenth century. One of these recitals, recording the journey to Lhasa and residence there of one of the missionaries, was discovered in an Italian library three years ago, and now first appears in English.

Chronological order has been strictly observed in this very painstaking summary, which may be welcomed, not only as a complete source of reference, but also as a readable and connected history of an important chain of events. The map is a good one, though its accurate information is rather crudely presented, and it lacks some desirable details supplied by the special map of the Royal Geographical Society.

"Verb. Sap." on going to West Africa, Northern and Southern Nigeria and to the Coasts. By Alan Field. 166 pp., Illustrations, Map and Index. John Bale, Sons & Danielsson, Ltd., London, 1905. (Price, 2s. 6d. net.)

A chatty little volume, giving the results of experience as to the outfit for a white person who is going to the west coast of Africa, and the kind of life he should lead there to diminish the climatic dangers. The book is undoubtedly of practical importance to those who go on this journey. The white races are just beginning to understand the art of outfitting for these regions and of living in them. Among the thousand-and-one hints in this small book some are likely to be of priceless value to white strangers in West Africa.

Incidentally much information is given about those countries. The author says Sierra Leone is pronounced as though spelled Salleone; and the names of some of the coast towns, as Accra, Grand Bassam, and Axim, have the emphasis on the last syllable.

Souvenirs Entomologiques. Études sur l'Instinct et les Mœurs des Insectes. (Neuvième Série.) Par J. Henri Fabre. 375 pp. and Illustrations. Librairie Ch. Delagrave, Paris, 1904 (?). (Price, 3.50 fr.)

This is the ninth volume in a series of studies of the instinct and habits of insects which has achieved general popularity in France, and has earned as well the commendation of entomologists. The author has a gift of patient observation and a pleasant way of telling of the discoveries that may reward the weeks and months spent in studying the animals of a single species. The daily life of some kinds of spiders, beetles, scorpions, and other insects is described in the present volume.

Dänemarks Natur und Volk. Eine Geographische Monographie. Von Dr. E. Löffler. iv and 119 pp., 39 Illustrations and Maps, Bibliography and Index. Lehmann & Stages Verlag, Copenhagen, 1905.

Gives a good general picture of Denmark, the Faroe Islands, and Iceland. The author is Professor of Geography in the University of Copenhagen. His treatment of the physical geography is in the approved German manner, and his general description of the islands and their inhabitants is much in the style of Reclus. His work is purely geographical, and does not deal with the economic aspects of the kingdom.

Landscape in History, and other Essays. By Sir Archibald Geikie. viii and 352 pp. The Macmillan Company, New York, 1905. (Price, 8s. 6d.)

This volume is a collection of essays and addresses which have appeared in various publications since Sir Archibald's delightful work, "Geological Essays at Home and Abroad," was given to the public. For years the author has given much study to scenery in its geological relations and its influence on human progress, and the first four essays in his present work deal with landscape in its relations to history, the imagination and literature, and with the origin of the scenery of the British Islands. Other chapters treat of Hutton's "Theory of the Earth," which gave an impetus to studies that evolved the modern science of geology—the age of the earth, the place of science in modern education, and the work and influence of Darwin and Hugh Miller. Thus the book deals largely with physical geography and the sciences related to it. Sir Archibald Geikie is one among those leaders of scientific thought who possess imagination and the charm of an attractive literary style, and these essays fully sustain the reputation he has acquired for his ability to interest a very wide public in the study of the face and the structure of the earth.

Ostasiatische Skizzen. Von Pauline Gräfin Montgelas. 105 pp. and 1 Illustration. Theodor Ackermann, Munich, 1905. (Price, M. 2.)

The author travelled widely in Eastern Asia in 1900-1903, under auspices that opened to her official doors and gave her unusual opportunities. These many sketches, all short and some of them under a page in length, offer nothing new to geographers, but their merit is something more than that of merely good reading. Countess Montgelas has the art of seizing promptly upon the point or the impression she wishes to make, and, having made it, she drops the subject. There is very little waste language, and the bits of information or description are vivid and full of local atmosphere. There is little doubt that many who are very well read in the literature relating to China proper, Japan, Corea, Mongolia, and Manchuria will find some new points of view and suggestive information in these sketches, slight as they are.

Countess Montgelas was one of the guests at the reception given by the Dowager Empress of China to the ladies of the foreign legations when, after her Majesty had assured the ladies that thenceforth they would all be the very best of friends, the wife of the American representative ventured to remind her hostess that she had given them the same assurance before the Boxer troubles, but that since then they had been penned up in Peking and shot at by her Majesty's subjects.

Highways and Byways in Derbyshire. By J. B. Firth. xvii and 500 pp., 74 Illustrations by Nelly Erichsen, 9 Maps and Index. The Macmillan Company, New York, 1905. (Price, $2.)

This is not a guide-book. It does not deal with show-places or describe scenery,

but it gives the literary and historical associations of Derbyshire, and thus supplies the human interest that adds so much to the enjoyment of travel. Others may describe the country town of Ashbourne, one of the pleasantest in England. But Ashbourne not only stands at the gate of exquisite scenery; it is also filled with the memories of great men. The book tells, for instance, of Dr. Samuel Johnson, who used to spend his holidays here with his lifelong friend Dr. Taylor, whose house is still the best private residence in the town. Dr. Taylor seems to have been a sly humourist; and we read that once when he expected the Duke of Devonshire to dine with him, "he gave orders that his Grace was to be driven twice round the grounds, so that he might imagine the garden was twice its real size."

The little town, also, has reminiscences of Tom Moore, of Samuel Rogers the banker-poet, and others. This was George Eliot's country, and those who wish to identify the places named in *Adam Bede* will not err, says Mr. Firth, if they interpret Oakbourne as Ashbourne, Snowfield as Wirksworth, Eagledale as Dovedale, Norbourne as Norbury.

It was in Derbyshire that Jean Jacques Rousseau began to write his famous *Confessions.* The wealth of reminiscence and anecdote concerning many interesting people will be appreciated most of all by those who visit England. The illustrations add greatly to the book.

Wirtschaftliche, naturgeschichtliche und klimatologische Abhandlungen aus Paraguay. Von H. Mangels. viii and 364 pp. and Illustrations from Photographs. Verlagsanstalt Dr. Fr. p. Datterer & Cie, Munich, 1904. (Price, M. 6.75.)

A number of German settlers in Paraguay undertook, in 1894, the publication of a weekly journal, *Paraguay Rundschau,* in the German language, in order to disseminate accurate information about the country. This journal still appears regularly in enlarged and improved form, and it is deservedly prized by all who are especially interested in the colonization of Paraguay and the development of its agricultural resources and commerce. Among the friends who contributed largely to its columns, though it could not afford to pay them for their work, was the author of this volume, long the German Consul at Asuncion.

The book is made up of the articles, revised and brought up to date, which Mr. Mangels originally wrote for the *Rundschau.* They are based upon his long experience and studies in the country, and bring together a large variety of information not yet easy to find; for the literature relating to the geography and development of Paraguay is not yet rich.

A chapter is given to agriculture and colonization in Spanish South America and the various colonial undertakings in Paraguay, and in others the climate, soils, economic plants, most important forest trees, crops, rubber-planting, poisonous and other obnoxious plants, fertilizers, and many other topics are treated. These contributions make a desirable volume.

La Picardie et les Regions voisines: Artois, Cambrésis, Beauvaisis. Par Albert Demangeon. 496 pp., 34 half-tone Illustrations, 50 Maps, and Bibliography. Librairie Armand Colin, Paris, 1905. (Price, 12 frs.)

A geographical study of the Picardy Plain, in northeast France. Picardy, with the neighbouring regions, forms a geographic entity facing areas on all sides that are topographically distant from it. Its aspect seldom varies, for throughout the plain are found about the same relief—rivers, soils, fields, and villages. But if the plain

has no very strong contrasts, and few show-places with which to astonish the tourist, it has a quaint and pleasing expression of its own, largely stamped upon it by its people, who rescued the inundated coast from the sea, fixed its sands, regenerated the soil by ingenuity and toil, and gave to most of the settlements the character rather of agricultural market-places than of busy towns.

Dr. Demangeon has done good service by his careful study of so unique a region, whose natural or human characteristics he describes and in many cases explains. The pictures, all from his own photographs, are excellent, and the numerous small black-and-white maps are helpful to the text. On the coloured map of the Picardy coast a curious discordance is explained in this way: It was made from a Government map, the northern part of which was revised in 1898 and the southern part in 1890. The two parts thus brought together in one map differ widely in the positions assigned to sandbanks and channels in the Baie de Somme, proving great instability in the submarine contours of that bay.

Bericht über die neuere Literatur zur deutschen Landeskunde. Bd. II (1900 und 1901). Im Auftrag der Zentralkommission für wissenschaftliche Landeskunde von Deutschland herausgegeben von Prof. Dr. Alfred Kirchhoff und Prof. Dr. Fritz Regel. viii and 413 pp., with Index of Authors. Ferdinand Hirt, Breslau, 1904. (Price, M. 12.)

The first volume of this bibliography was published in 1901, and contained titles of and comments upon 952 geographical works relating to Germany and published in the four years 1896–99. In the second volume now before us, Dr. Regel has succeeded Dr. K. Hassert as joint editor with Dr. Kirchhoff, large collaboration among German geographers has been secured, and the number of titles of books, monographs, maps, etc., has been increased to about 2,000, though the period covered is only two years. The book is not unwieldy, because the explanations and comments added to the titles are short as compared with those in the first volume. On the whole, this change is probably desirable, for it facilitates reference by reducing bulk. A bibliography is valuable in proportion to its completeness as a directory; and summaries of contents, and especially criticism, may usually be left to the review departments of the critical journals.

These 2,000 items are admirably arranged in chief classifications and groups under them. If we wish, for example, to learn what was written in 1900 and 1901 on the interior waters of Germany in all their phases, we find these topics grouped in "Die Gewässer" under the larger classification "Das Land," and find that these titles appear between pp. 86 and 87. The whole field is covered under 4 large divisions, with 25 subordinate groups.

It is easy to see how helpful such exhaustive compilations may be in the examination of any phase of German geography. They are essential in a country the study of whose geography has been so minute and many-sided. The Germans excel not only in applying their superior geographic training to the study of their own land, but also in the thorough classification of the knowledge they have gained, as exemplified in this bibliography.

BULLETIN

OF THE

AMERICAN GEOGRAPHICAL SOCIETY.

Vol. XXXVII 1905. No. 8

THE BASIN OF LAKE TITICACA.

BY

A. F. BANDELIER.

In the heart of the western part of South America, between the 16th and 17th degrees of south latitude and the 68th and 70th of longitude west of Greenwich, lies the extensive water-sheet of Lake Titicaca, at an altitude of 12,466 feet above the level of the Pacific. By air-line it is about 300 miles from the western, and at least 2,000 miles from the Atlantic, shore. Peru claims two-thirds of its surface, and Bolivia the southeastern third; but, as yet, the boundary-line is rather indefinite.

Approach to the lake from the west and southwest is quite abrupt as far as Arequipa, where the peaks of the slumbering volcano Misti (19,250 feet), and its northern companion Charchani (20,300), rise like towering monuments. They are, for some distance, the most southerly pillars (Pichu-Pichu, about 18,000 feet high, forming but an elongated crest) of the Peruvian coast Cordillera. North of Arequipa a number of summits, part of which are mentioned in dim Indian tradition as formerly active volcanoes, rise to still greater elevations, like the Koro-Puna, the altitude of which is said to exceed 23,000 feet, which would make it the highest mountain on the American continent, so far as known. Crossing, between Misti and Charchani, a wild labyrinth of volcanic débris, a high table-land is reached, on which the railroad has to climb to 14,660 feet at the station of Cruces, near Vincocaya. This plateau is cold, bleak, and correspondingly dismal. The vicuña still roams over it in small flocks, and human abodes are few and far between. From near the culminating point the column of smoke issuing from the crater of the volcano of Ubinas rises on the southern horizon,

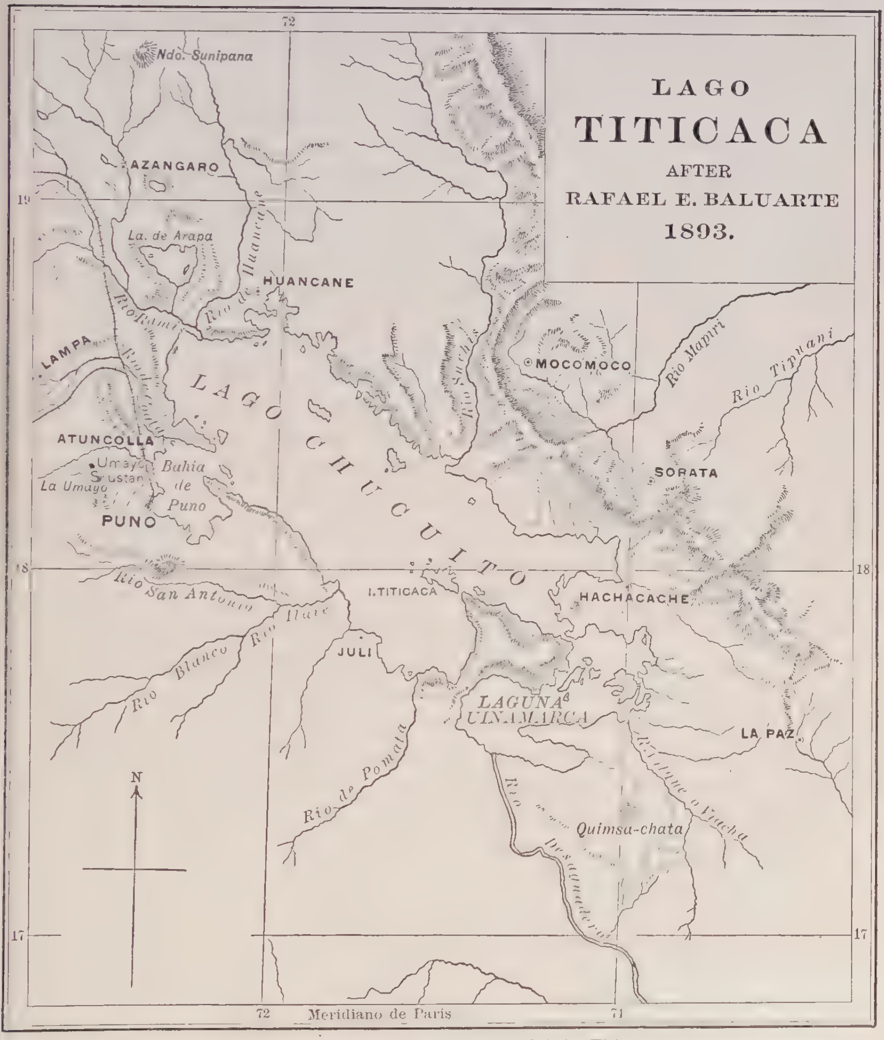
and the dark mass of Omate, the top of which was blown to atoms during the terrible eruption of 1600 (like that of Coseguina in Central America, and Mont Pelé in Martinique), rises up in the neighbourhood of Ubinas with its four prongs, indicating the ruins of its crater.

Descent to Lake Titicaca is gradual. The beautiful lagoons of Saracocha and Parinacocha, picturesque, but with very bleak shores, nestle at the base of the snow-clad range of Lampa; then a deep furrow is entered that has some arborescent vegetation, and a number of Indian settlements, haciendas, and the mining establishment of Maravillas. This furrow leads to the marshy shores of the Rio Ramis at Juliaca, a village, the site of which was occupied by an Indian settlement at the time of the Conquest. The region now reached belonged to what in primitive times was termed the Collao, and held by Indians of Aymará stock. Since then the Quichua have, under Spanish rule, slowly encroached, and they occupy the territory as far as the northern half of the town of Puno.

Lake Titicaca is reached by the railroad near the former principal settlements of the Aymará, Paucar-Colla, and Hatun-Colla, now reduced to insignificant hamlets. Neither were they ever very populous. The idea of a former large population belongs to romance. Statistics prove that the present Indian population of these regions has not diminished; and the evidence adduced in favour of a supposed dense primitive settlement of the land, based upon the countless artificial terraces that streak nearly every slope, is by no means conclusive. The extent of levels is small, and, where they lie along streams and are therefore susceptible of irrigation, they are also exposed to overflow; and a large portion of them is occupied by marshes, which, along the Ramis, are often alkaline. For this reason the Indian had to cultivate the slopes in preference, converting them into narrow terraced garden-beds. This system obtains to-day, and many of the andenes (as the Quichuas call them) are *modern.* Furthermore, the Indian had no fertilizers; neither will he use manure to-day, but prefers to let the soil restore its productiveness through rest. That rest lasts, according to local conditions, from one to ten and more years, so that only a limited extent of the numberless artificial terraces was tilled at the same time, and these are, consequently, no criterion as to former numbers of the people.

Already from the heights overlooking the track along the lakeshore a glimpse is obtained of the magnificent chain of snowy

peaks extending along the eastern side of Lake Titicaca from southeastern Peru into central Bolivia, and known, in its Bolivian portion, as the Andes of Bolivia, or Cordillera Real. Along the base of these magnificent Alps of South America, conspicuous through the strong individualization of each mountain and the



NOTE.—*Chucuito* is an older name of Lake Titicaca.

abundance of characteristic glaciers, Lake Titicaca extends from northwest to southeast like a trough, abrupt and very deep along the northeastern, and gently sloping from the western, shore, as far as the main body of the lake extends.

Puno existed, as an Indian village, certainly in 1548; hence, it is likely that the site was occupied already before the Conquest. It now has about 5,500 inhabitants, the majority of whom are mixed with Indian blood. The Spanish settlement was officially recognized as such in 1668 or 1669. It is the Peruvian port for the navigation of the lake to the Bolivian shores.

Lake Titicaca fills a trough about 120 miles long, at the southwestern base of the Bolivian Andes. It consists of the main lake, 41 miles wide at its greatest expansion, and several large bays, like the lagoon of Chucuito, on which Puno is located, the most northern bay in front of Taraco and Vilque on Peruvian territory, and the extreme southeastern lagoons of Chililaya and Uinamarca. While in the main lake accurate determinations of depths on the west give no figures much in excess of 609 feet, on the eastern or Bolivian side we find 828 and 841 feet. Near the little island of Koa 1,312 feet are recorded. It is certain that about the Island of Titicaca, the promontory of Copacavana, and as far as the mouth of the straits of Tiquina, the lake is very deep; but in these straits, by which the main lake communicates with its southeastern annexes, depths diminish almost suddenly to 230 feet. It looks, therefore, as if Lake Titicaca had been imperceptibly falling during a period of unknown length. The lagoon of Umayo (near which stand the Inca buildings of Sillustani) was formerly connected, if tradition is right, with the lake; now the water has receded from the channels that established connection.

The only outflow of Lake Titicaca is the Desaguadero, a channel of sluggish waters draining into the lagoon of Poopó, in the southwest, which, in turn, has no visible outlet. There is traditional indication to the effect that the Desaguadero was opened (through some unknown process) at a very remote period, still within the scope of dim memory. It is also possible that, not many centuries previous to the Columbian Era, the lagoon of Uinamarca bathed a part of what are now the ruins of Tiahuanaco.

The water of Lake Titicaca is brackish, but not unwholesome. We had to drink it for several weeks almost exclusively, on the island of Koati, and felt no bad effects. It is always cold. At a depth of 99 feet Agassiz found its temperature to be 15° *centigrade*, at 450 feet 10°.6. Nobody has, as yet, been able to withstand its numbing effects longer than about a quarter of an hour.

There is, as indicated, a single outlet to the lake, the Desaguadero, and the feeders are few, on the surface. The Ramis and Suchez enter from the north, from the east the Rio de Achacache.

None of these rivers is more than an ordinary stream, not large enough for navigation.

During winter the sky is mostly of an intense blue, the air chilling, while the sun's rays scorch and burn face and hands. Still, thunderstorms occur every month, and snowfalls are not uncommon. In summer a lowering sky often covers the mountain ranges, which are the only redeeming feature of the landscape; thunderstorms are of almost daily occurrence, thunderbolts very frequent, and waterspouts not rare. We saw two together, in the middle of the lake, and reliable informers state that as many as five have been observed at the same time. During tempestuous nights St. Elmo fires gleam on the steamers' masts. And, yet, rare is the evening when, for a few hours at least, the Bolivian Cordillera does not shine out, even if thin vapour rises before it from the deep gorges at its foot, and seldom is the whole chain, from the Carabaya range, in the north, to Illimani, in the extreme south, completely shrouded. In August, when winter is at its height and the skies cloudless, the Bolivian Andes sometimes display an alpine glow of unequalled splendour.

Our observations of temperature on Titicaca Island, carried on for three and a half months in succession, and later ones on the same island and on its neighbour, Koati, indicate a very equable climate. The mean for January, 1895, was 54.9°; for February, 55.2°; in March, 54.8°. In winter of the same year temperatures were, of course, lower, but the extremes of temperature from January first to July first, 1895, were only 65° and 33°. I do not lose sight of the fact that such local observations, carried on for a short period only, have no value except for their time and the place where they were taken; but meteorological observations at La Paz extend over a period of many years, and establish the equableness of the climate beyond any doubt. That climate has, in fact, but two seasons—winter, which is cold and less moist, and summer, which is wet and equally cold. One is as disagreeable as the other, though not unhealthy.

To the coldness of the climate (first of all a consequence of the great altitude) the proximity of the snowy ranges contributes. In the west the few summits that rise above the snow-line between Puno and Moquegua, the Kaualluni, and the Uilcaconga, are neither high nor striking in appearance. The lofty ranges between Cuzco and Juliaca, towering Kunnu-Rona (Santa Rosa), and bold Vilcata, that rises above the source of the Amazon River, at La Raya, are too distant. But the eastern range approaches the lake as near

as twenty-five miles in its two culminating peaks of the Sorata group, the Hilampi, or Hanko-Kunnu, and the Hanko-Uma, rising respectively to 21,300 and 21,490 feet, according to latest determinations. The Sorata group terminates the "royal range" (*Cordillera real*) in the north. South of it that alpine chain of unsurpassed beauty in outline and in abundance of formidable glaciers, but without the softening feature of meadows and forests—grand, solemn, and chilling—extends to its southern pillar, Illimani, the altitude of which was determined by Sir Martin Conway, on his *first* (and thus far *only*) ascent, in September, 1898, at 21,190 feet. Between Sorata and Illimani the strikingly individualized peaks exceed, as far as known, twenty thousand feet at only two or three places. The Karka-Jake (erroneously called Huayna Potosi) reaches 20,300, and the Chachacomani 20,600 feet.

Glaciers abound on the *Pacific slopes* of the chain. The Atlantic declivity is very steep; hence shows few of these truly alpine features. At present, and for a number of years past, the glaciers of the Bolivian Andes have been in slow retrocession. The deep clefts, meandering from the fronts of actual glaciers towards the upper Puna, or tableland, bear every mark of having been eroded by glacial action at a very remote period.

North of the Sorata group there is a break in the continuity of the snowy range. The Andes of Carabaya lie farther from the lake basin than those of Bolivia, but are visible from the western shores and from Puno. Their relative altitudes are as yet but imperfectly known. Their most important and most northerly group, Ananea and Palomani, may yet prove higher than believed, for both snmmits rise out of enormous glaciers and snow fields. South of them the chain is made up of picturesque clusters of sharp peaks and cones; but the snow-line is not unbroken, as farther south. The eastern slope is, as everywhere else in that region, very steep.

This extensive barrier, separating Lake Titicaca from the wooded lowlands of the Amazonian basin, acts to intensify the chill in the climate of Titicaca. The Indian, who looks at nature only from the standpoint of the dangerous or the useful—who feels, above all, his own helplessness in presence of incomprehensible phenomena—sees in the stately peaks the abodes of spirits, and worships them as such. The taller the mountain, the more powerful the Achachila (literally, "grandfather") supposed to dwell in it. To the Indians of the main islands in the lake the principal *Nevados* appeal mostly as originators of angry blasts and damaging frost.

The region of the lake, as well as the mountains, has as yet been but partially investigated from a geological point of view. The crest of the Bolivian Andes and the upper slopes are Silurian, but here and there traversed by upheavals of syenite, as, for instance, at the so-called Huayna Potosi. Lower down and as far as the middle of the table-land, or Puna, Devonian strata appear. On the west the Permian formation prevails. The basin proper is also crossed by streaks of carboniferous rocks, containing stone-coal of a fair quality, not seldom accompanied by trachytic (andesitic) dykes. The Puna south of the lake is said to be Devonian in the main. Explorations conducted by Prof. A. Dereims, the French geologist, will at last furnish us a true picture of the geology of the region.

The mineral resources of the surroundings of Lake Titicaca are not inconsiderable. Coal does not, as yet, play any rôle in production, which is the more regrettable that its quality is good and the seams are of easy access. Copper in its native state, as large chunks or blocks, but chiefly disseminated in minute particles through a Permian sand-rock, in proportions varying from less than ten to seventy-five per cent., crops out at Corocoro, near the Desaguadero, in enormous veins tilted at an angle of about forty-five degrees. Tin is worked in the cordillera not far south of La Paz; and it is also found at Carabuco, near the lake shore. Silver ores abound in the district of Sicasica, and gold is now washed on a large scale at the very doors of the City of La Paz. In the mineral wealth lies the future of the lake region and in the industries therefrom resulting; neither the vegetable nor the animal kingdom offers any inducements.

At an elevation of twelve thousand feet, vegetation, even under the tropics, is reduced to a minimum. Not many spots on the lake-shore are sheltered enough to permit the growth of trees and of low, bushy maize. The surroundings of the sanctuary of Copacavana offer a succession of favoured nooks, where, besides some trees imported by the Spaniards, like the eucalyptus, the wild olive tree (*Buddleya coriacea*), the keñua (*Polylepsis racemosa*), and Sambucus Peruviana, grow in stunted specimens. This is also the case on the southern promontory of Titicaca Island, at Keñuani, and especially in two gardens on the island erroneously ascribed to the Inca, while they are both Spanish and of the eighteenth century, if not later. On these two lovely spots an abundance of European flowers and some vegetables, also strawberries, still thrive under the shade of imported and indigenous trees. On the

peninsula of Huata similar spots are found; elsewhere vegetation is limited to the dismal Puna grass (*Stipa Ichu*) and smaller shrubs, some of which are used by the Indians in medicine and witchcraft.

Alimentary plants may be divided into two classes—indigenous and imported. Among the former the *potato* occupies the first rank. It is the leading staple of the mountain region in general. But cold and moisture prevent its preservation in the natural state. Combustible to dry the potato there is not enough; hence the only means to keep it is to let it freeze, then press out as fully as possible every trace of moisture, let it freeze again, and thus, reducing the tuber to a mere cork-like, insipid mass, render it invulnerable against cold and humidity. The chuña, as this unpalatable metamorphosis of the (otherwise splendid) potato is called, is the main food on these highlands, and of all classes of society, without exception. Next to the potato comes the oca (*Oxalis tuberosa*), the quinoa (*Chenopodium quinoa*), maize, and the so-called papa liza, a most indigestible tuber of the potato kind. Imported alimentary plants are limited to barley and to a coarse, large bean, the haba. Vegetables would grow very well on the islands. We have seen, on Koati, plants that were almost arboriferous; but the Indian is far too conservative to change his diet. He prefers his primitive food, heavy and yet not nutritious, to wholesome aliments unknown to his ancestors.

Neither hill nor vale is without flowers. Along the lake and in sunny coves the kantuka—carmine, red, yellow, and white—droops from the branches among the vivid green foliage of a tall shrub. On humid expanses the panti-panti displays its white or pink blossoms. Verbenas cover the slopes in patches. Many an insignificant bush has a modest but pleasing little flower, and the quinoa presents, when in bloom, entire fields draped in the national colours of Bolivia—red, yellow, and green. On the other hand, miles and miles offer nothing to the eye but, along the shores of the lake, lonely gray or dull green, with rocks intervening, or, in the interior, interminable levels of coarse Puna grass, dotted by the adobe or stone huts of the natives, their tiny fields, and an occasional drove of llamas.

Animal life is irregularly distributed. The middle of the lake sees occasionally a gull (*Larus serranus*) following the steamer. Of the six kinds of fishes thus far known few specimens appear on the surface. It is on the shores of bays like the large one of Achacache, on the waters of the picturesque harbours of the island of Titicaca and the peninsula of Huata, also on the roadsteads of

Chililaya and others, mostly where the tatora or lake reed (*Malacochaete Tatora*) thrives in shallow places, that aquatic birds of the lake are mostly seen. The choka (*Fulica gigantea*), a stately water-hen of black metallic plumage, with bright-coloured head and bill, glides quietly over the little ruffled surface of inner bays. Turbulent divers (*Podiceps*, *Tachybaptus*, and *Centropelma*) furrow the water around them like diminutive tug-boats, crossing and chasing each other with amazing rapidity. Along the mainland the flamingo and the rose-coloured spoon-bill are not rare, and a dark-green ibis stalks over marshy expanses. An ashy gray night heron is sometimes seen erect on rocky points, and the black cormorant peoples smaller islands, affording the Indians, who visit them in frail balsas, a repulsive aliment in young birds and eggs with greenish yolks, both equally disgusting through their fishy smell and taste. A gray eagle soars over the rocks skirting the shores, and that handsome scavenger, the alkamari, stalks in pairs over fields and bare slopes. I forbear mentioning enigmatical beasts like the supposed seal, although there is enough in reports about the animal to excite legitimate curiosity. Neither do I dwell on the innocent toads, which the Indians gather and expose on dry rocks as often as they fear drouth. I also pass by the small scorpions, centipedes, and spiders, often disturbed by the opening of ancient sepulchres. But I cannot overlook the godfather of the Island of Titicaca, the species of wild-cat to which the name is due. *Titi* means the lynx-like feline haunting the shores of the Lake, from which, probably, it sometimes found ways and means of crossing over to the island. *Karka* (whence Kaka) signifies a rock, or cluster of rocks. The strangely-situated cliff on the island, which was a shrine since time immemorial, is called Titi-Kala, or *stone of the cat*, since there are on its vertical face some concavities recalling heads of cats, on which the Indians looked with superstitious awe. Hence the wild-cat (called *Mulu-Mulu* along the slopes of Illimani) has given its name to the main island, whence, after the sixteenth century, it became generally applied to the whole lake. To-day still, the Aymará call the water-sheet simply *kota*—lake or sea. The Titi pays disagreeable attention to domestic fowl. During the seventeenth century its occasional appearance on the island gave rise to the well-worn tale of the carbuncle, a cat with fiery eyes and a luminous stone on its forehead. In former times the vicuña and even the guanaco were occasional visitors of the lake-shore, and they roamed through the districts west and south of the lake. The eastern shore, as well as the

Andes, were and are, especially the latter, frequented by the vicuña only. What we were told about the occurrence of the guanaco is problematic. I would also allude here to the not uninteresting fact that the condor, that huge bird of prey and carrion, while roosting in the Bolivian Andes about Illimani, is hardly ever a visitor of the lake or the plateau, whereas the easily-domesticated Puna goose (*Benicla Melanoptera*) lives on one of the haciendas as tame as any ordinary member of the "civilized" species, and we had the daily visit of a pair of these handsome birds on the sandy shore of Challa, on the island.

Both the llama and the paca are kept in large numbers around the lake—the former as a beast of burthen, the latter for its precious wool. Along the base of the northern range, on the dismal and cold levels that skirt the snowy peaks of Suchez, of Katantika, Kololo and Altarani and Ca, the paca pastures by thousands. They do not, however, go up near the mountain passes, where, as all along the snowy range, emerald-green lagunes, fed from the glaciers, offer a far better drinking water than any on the Puna. The vizcacha accompanies the vicuña to the highest crests, but it also makes its home on the Puna, wherever clusters of rocks protrude. So does the chinchilla, on the Puna nearer the Chilian frontier.

Since the Spanish occupation the Indian has additional domestic animals. He has the ass, the mule, the horse, and cattle and sheep. But he takes no care of them; hence the breed is poor and weakly. The llama and its kind, however, he fondles, for it is a time-honoured associate.

Outside of the city of Puno and a few unimportant villages along the lake, the white population hardly exists. Indians—Quichua in the north and northeast, Aymará to the south, and Mestizos—are the overwhelming majority. Intercourse with them—protracted contact—is far from agreeable, especially with the Aymará, who are a retrograde, stubborn, and naturally bloodthirsty stock. Distribution of the settlements is unequal. After sallying from the lagoon of Chucuito, where the village of the same name and that of Acora are the chief places, we pass successively Juli, Ilave, Pomata, and Yunguyu, leaving Zepita in the distance. All these villages together, and their surroundings, have to-day, according to Peruvian statistics, as many Indians as at the time of the Conquest. The Peruvian coast is low and monotonous; it fronts the widest part of the lake called Pampa de Ilave, where storms are much feared. Already there, the largest island of the lake, Titicaca, appears, seemingly connected with the peninsula of Copacavana

facing it. As we approach, Titicaca detaches itself, assuming its true insular shape. It is about seven miles long, and has the form of an elongated toad. The lake makes not less than seventeen well-marked indentations into its shores, some of which are most picturesque bays. The backbone of the island is a long ridge, but the highest points lie outside of it—northwest and southeast. The former, Chullun-Cayani, overlooks the lake directly; the other, Pallasa, is off the shore, and both are 800 feet above the lake. The island is one of the most romantic spots imaginable, notwithstanding lack of vegetation. We lived on it for over five months in all, and, with all the inclemency of climate and the evil disposition of the eight hundred Indians who live on the two haciendas into which the island is divided—with all their constant disobedience of most positive orders from the owners to respect and attend us as if we had been the proprietors themselves—this marvellous island, with its coves, its promontories, its unparalleled panoramas and outlooks, its modestly picturesque ruins, remains, and will always remain, the ideal of our dreams.

It is as if a reflex of its beauty had been cast on the peninsula of Copacavana, from which it is separated by the narrow channel of Yampupata. The sanctuary of Our Lady of Copacavana, famous in Bolivia since 1586 (although the once beautiful church was only begun in about 1640,), stands on a lovely site; but, unfortunately, the village of Copacavana is a dreary hamlet, and only alive when the festivals of the Church gather thousands of boisterous Indians to dance in the plaza. Such dances are survivals to which the Indian clings with great tenacity, while their original meaning is only known to a small number of the aborigines. These celebrations, while attractive at first sight through quaintness and colour, become disgusting very soon through the carousals which form, and always formed, an indispensable corollary.

Copacavana has many natural charms. The triangle which the peninsula forms is as diversified in topography as odd in outline. Its Indian population is comparatively dense, of evil inclinations, and does not appear to have suffered any diminution since 1538. Tillage of the soil on a small scale and some cattle-raising give them occupation when their time is not taken up by feasting and carousing; and so it is all over Bolivia and the mountainous section of Peru.

Few lakes in the world have a greater number of islands and islets than Titicaca. Entrance to the bay of Chucuito is guarded by two large ones—Amantaní and Taquili, of which the latter has

served repeatedly as a place where political prisoners were left to pine. Beyond the main island of Titicaca, towards the Bolivian end of the lake, lies Koati—green, almost treeless, but notorious for its Inca ruins, not extensive nor architecturally re markable, but well preserved and on a spot of unusual beauty, selected by the Indians for its warmth and because it faces the majestic summits of the Sorata chain, which are, to the Indian, very "big medicine."

Around Titicaca Island are a number of small isles, that appear like remnants of a former connection between the peninsula of Copacavana and that of Huata. The straits of Tiquina, very narrow, but not deep, and with steep, rocky shores, separate the two promontories. They also separate the main lake from the southern, comparatively very shallow, basins of Chililaya or Huarina, and of Uinamarca, at the southwestern end of which opens the Desaguadero channel. Between the two basins lie a number of not unprepossessing islands, mostly inhabited. There are about thirty of them, many of which bear ruins of primitive settlements. South of the lake expands the bleak Puna, between twelve and fourteen thousand feet above the Pacific, and, at a distance of forty miles south of Chililaya, the cleft of the La Paz River opens, through which that stream, hugging the mountain notch of Illimani, meanders to the basin of the Amazon.

Of the pre-Columbian condition of the inhabitants of Titicaca basin, many ruins, promiscuously scattered, bear testimony. Aside from those of Tiahuanaco, the past of which is still shrouded in mystery, ruins of Inca origin in the shape of more or less elaborate storehouses of stone and adobe, and ceremonial edifices of modest size on the Island of Titicaca, on Koati, and around Copacavana—finally the many vestiges of Aymará occupation in the so-called Chullpas or dwellings with house-burial, on the Puna as well as in the mountains—show that, in pre-Spanish times, the lake region was occupied almost exclusively by Aymará Indians. These had, to a limited extent, been overcome by the Inca tribe of Cuzco, but never incorporated into a national or political union, of which no aggressive Indian tribe in America had any conception. These ruins indicate a population not in excess of the present number of Indians, but of a shifting disposition, to which Spanish rule put an end. The influence of the Incas was limited to levying tribute, and their architectural remains in the lake basin indicate permanence only in very few places.

THE ECONOMIC IMPORTANCE OF THE PLATEAUX IN TROPIC AMERICA.

BY

J. RUSSELL SMITH.

The plateaux and plains of Tropic America offer an interesting paradox in their relation to the foreign commerce of those regions. The highlands are the chief seats of population; the lowlands are the natural and, indeed, the only place for the production of most of the large and increasingly important list of staples for which the non-tropical regions depend upon the tropical. Here is a vast field for ethnic and industrial readjustment, by which the people should locate themselves where they can have access to the resources.

A survey of that half of the American continent lying between the Rio Grande and the Rio de la Plata shows a topographic distribution of population the exact opposite of that prevailing in the temperate parts of the American hemisphere, in Europe, and in Asia.

In North America the early colonists established themselves in the Atlantic Plain, gradually worked up the valleys of the Atlantic rivers, and then westward into the basin of the Great Lakes, to the Valley of the Mississippi and its northern extension, which is fast becoming the seat of empire upon the continent. Along the Pacific Coast similar conditions are repeated. The valleys of California, Oregon, and Washington contain nearly all the population of those States, leaving large areas outside, with very scanty population.

In Europe the dense populations are on the good lands of the Great Low Plain, extending from the Pyrenees to the Urals, and in the valleys of the Po, the Danube, and the British rivers. In Asia the great preponderance of the people, possibly nine-tenths of the population of the whole continent, and half the people of the world, are crowded into the lowlands of the monsoon countries between the Indus and Manchuria and northern Japan. Upon these lands the summer monsoon rains make possible the growth of heavy summer crops. In over-populated Japan the agriculture is practically limited to 12 per cent. of the land—a mere fringe around the edge of the mountainous isles, where irrigation can be secured for intensive agriculture, as her mountain streams flow across the narrow plains to the sea.

Throughout tropic America the centres of population are, with certain exceptions, upon the interior highlands, and 99 per cent. of

the vast area of lowland skirting the two oceans, and sometimes reaching the interior of the continent, is an unsettled, unused land. Instead of being the home of peoples, as in the temperate lands, it has always been a bar to settlement, and is to this day a hindrance or a prohibition to commerce, and a vast land reserve of unknown possibilities for a more resourceful future to utilize.

In Mexico the geographers usually classify three zones—the cold, the temperate, and the hot, corresponding to the plateau, the slopes, and the low plains. Upon the first two are centred nine-tenths of the people. The plateau has in some sections a population as dense as that of France, and, considering its aridity, is really over-populated, and the pressure of people upon subsistence is causing an alarming denudation of the rather scanty forest growth. Aside from the small seaport cities, the lowlands have a sparse population of wild Indians, lumbermen, and other workers in the forest. A few new plantations have of late been started there, and this new work, in conjunction with recent railroad-building, has created a demand for labour that can only be met by importing labourers from the plateau, and one of the present reforms of the Government is to stop the carrying away of the highland-dwellers to involuntary servitude in the lowland forests.

Central America is still more pronouncedly a plateau country. The heavy rains from the trade-winds give dense forests to the slopes, and reduce much of the coastal plain to swampy jungle. The Atlantic plain being wider than the Pacific, the plateau between the double mountain ranges to the west was more easily reached from the latter ocean, from which it was settled, and through whose ports its commerce was for more than three centuries almost exclusively carried on. In recent years coastal settlements along the Caribbean have grown through the rise of the banana industry, and Costa Rica and Guatemala have shifted a part of their commerce to the east through the opening of railroads to Caribbean ports; but, in the main, Central America is still, economically speaking, a Pacific country, because the centres of population, being upon the plateau, lie nearer to that ocean, and use it as their highway to the outside world.

The Pacific Coast of South America shows, in the main, the same conditions. The marine plain from Panama to Central Ecuador is wet, forest-clad and, except for a few unwholesome ports, possessed entirely by a few wandering Indians. Ecuador consists of a fertile low plain containing one-fourth of the population, and a high, isolated, and hilly plateau between the ranges of the Andes,

upon which the remaining three-fourths of the people are crowded. Peru presents a similar spectacle, with comparatively dense population upon a plateau so high that men wear woollen masks to protect their faces from the cutting winds. The Peruvian coast lands have a greater development than any other in tropic America, owing to the aridity and healthfulness of the desert and a water supply from the Andes to support agriculture by irrigation.

In northern South America the outlying ramifications of the Andes mark the limits of the really-peopled districts. Columbia, drained by the splendid Magdalena, uses the surface of the river as a means of communication between the sea coasts and the isolated plateau settlements, while the great valley lies almost untenanted. Venezuela has a similar condition; but, fortunately, her plateaux, centring around Caracas, are nearer the sea. The Orinoco, with tens and hundreds of thousands of square miles of grass lands, and of forest lands, has a few feeble settlements, supplied by one trading steamer. This valley typifies the condition of the interior of the South American continent. One of the world's greatest plains extends from the mouth of the Orinoco to the mouth of the Rio de la Plata and from the mouth of the Amazon to the foot of the Andes—a region that doubles the area of the Mississippi Valley, with its 40,000,000 people, or the Yantgtse-Kiang, with 150,000,000. But the South American land is a land unknown. In northern Argentina, even outside the tropic, large rivers have never been correctly charted, and in the Amazon Valley American Commonwealths could be lost to the world if put down in the midst of unexplored reaches of jungle. Only the larger streams have been navigated by native and Portuguese rubber-gatherers and a few scientific expeditions.

In Brazil the centre of population is on the plateau lying inland from Rio de Janeiro and Santos, and on both sides of the Tropic of Capricorn. In this area, the centre of the world's coffee production, is the best-developed railway-net to be found in the Torrid Zone. The elevation of the district, however, robs it of full tropic climate.

The coast of Brazil has the largest seaports of tropic America—Rio de Janeiro, Bahia, and Pernambuco. These cities are all on a coast swept by the trade winds, and excepting Rio, which is the national capital and the port for a large interior district, they are the centre of producing districts of small area lying close to the sea. In British Guiana this characteristic is more pointedly brought to notice, because nearly all the exports of this large colony are grown on a strip of alluvium diked and reclaimed from the sea after

the manner of Holland. Furthermore, the coast settlements and cities from Rio de Janeiro to Guiana are largely populated by negroes or mulattoes, or, as in Guiana, by imported East Indian coolies.

The location of cities in tropic America shows forcibly the importance of the plateau. In temperate North America and in northern Europe there is no national capital that is not located on a low plain. Many of them are seaports, and all can be reached from the sea by at least river or canal navigation. In all tropic America there are eleven independent nations, excepting Panama, and, of the twelve, but one, Brazil, has a capital city that is also a seaport. The Brazilian capital is not fully maritime, since the suburb of Petropolis, on the escarpment of the plateau, over 3,000 feet above, is the real administrative centre, the residence of the Diplomatic Corps and the Brazilian aristocracy, and it has also a growing textile industry. The other ten capitals of the American tropic are beyond the reach of any kind of navigable connection with the ocean, and are usually situate upon plateaux from 2,000 to 9,000 feet in elevation, where good drainage and cool and wholesome climate prevail.* The colonies of Guiana and Belize and the Republic of Panama do not enter into this comparison, because they possess no available plateaux for capital sites.

This centring of city, as well as country, life upon the plateau leads to a peculiarity which may really be called a division of city functions. In the temperate zone every seaport develops in time into a considerable industrial centre, the productive industries often supporting more of the population than the purely commercial. In the greater part of tropic America these two services are separated, and the city may be thought of as in two parts—one the port commercial, the other upon the highland as industrial, administrative, and residential. In Costa Rica the capital, San José, has its port in Port Limon; Caracas has La Guayra and Puerto Cabello; Lima, Callao; and Santos, Brazil, with 20,000 people, is the greatest coffee port in the world and the port for São Paulo, a thriving plateau city with a population of nearly 200,000. Each of these ports is much smaller than the city for which it is the outlet, the ratio ranging from about one-third to one-tenth, or even less; the City of Mexico having over 700,000 people,† and the combined populations of the ports of Vera Cruz and Tampico not more than 50,000.

* These statements require modification. Lima, the capital of Peru, stands on a plain less than 600 feet above the sea and within seven miles of the Pacific; Buenos Aires, the capital of the Argentine Republic and its largest seaport, is on the La Plata estuary; and Montevideo, the capital and chief seaport of Uruguay, is on the north side of the same estuary.—(Editor Bulletin.)

† According to the census of 1900 the population of Mexico was 344,721.

The economic effect of this predominance of the plateau is that the population is located on the least productive lands, and commerce is handicapped by the great difficulty of reaching the sea. This difficulty at times borders upon prohibition—and it is prohibition for commerce in any modern sense of the word. The upland dwellers of Ecuador, for example, numbering hundreds of thousands, possibly a million, and including the capital of the country, were, until the beginning of railroad work now in progress, dependent for connection with the outside world entirely upon a mule-trail, where life and property were often threatened with destruction by slipping from narrow rocks to abysses below. Another part of this same trail crosses the lowlands, which rainy seasons often made impassable for even pack animals. This case is extreme in the number of people dependent upon a single route; but it is fairly typical of the conditions that lie between a large proportion of the people of tropic America and the world highway, the ocean. As a natural result of this isolation, a large proportion of these people have almost no foreign commerce whatever. The statement is not made that any single country has no foreign trade, for they all have; but also they usually have a considerable share of the people who have almost no part in this trade, and who live in a house of local construction, sometimes without an iron nail in it, eat home-grown food entirely, and wear clothing of the meagrest pattern, possibly of homespun, possibly imported cloth.

These facts are indicated by an examination of the products exported from these regions. Classifying them in two lists, we see the relative part taken by the highlands and the lowlands.

List of Products Exported from Tropic America.				Staple Tropical Products Imported by Temperate Peoples from Eastern Tropics.
PLATEAU PRODUCTS.	LOWLAND PRODUCTS.			
Coffee.	Rubber.	Cabinet woods.	Brazil nuts.	Tea.
Ores and metals.	Sugar.	Dividivi.	Cochineal.	Rice.
Hides and skins.	Cocoa.	Spices.	Fibres and bristles.	Manila hemp.
Wool.	Banana.	Sarsaparilla.	Cocaine and drugs.	Jute.
	Orange.	Vanilla.	Panama hats.	Varnish gums.
	Cotton.	Indigo.	Many miscellaneous articles in small quantities.	Pepper and other spices.
	Tobacco.	Cinchona bark.		
	Gold.	Cocoanut.		
	Asphalt.	Ivory nuts.		
	Cedar.			
	Mahogany.			
	Dyewoods.			

The plateau list is short but important in the volume and value

of its articles. The lowland list is much longer, with no single article equalling in importance the two leaders in the plateau column; but as a group they are exceedingly important for modern commerce, and of great promise for the future. Only one of the plateau products is really tropical—coffee; and it is not fully established that it is limited to plateaux. Some very suggestive experiments in coffee culture are being carried on at low elevations in Mexico. The ores and metals are natural mountain products in all climes, and the mountains in the countries under review are rich in minerals. The skins of cattle, goats, sheep, deer and other wild animals, are commodities of high value, good keeping qualities, and easy transport, and, along with some wool, they make up the most universal basis of export from the plateaux, and, along with metals, pay for the meagre imports of those regions which are not so fortunate as to grow coffee. It thus appears that many of the people within the Torrid Zone are trading exclusively in non-tropical produce, and that the large majority of the population, those upon the plateau, have probably a small majority of the commerce, including but one tropic product of importance.

There yet remains a long list of really tropical and lowland products, the ones we think of when the word "tropic" is spoken—rubber, cacao, sugar, bananas, mahogany, dyewoods, and all the roots, fruits, nuts, drugs, extracts and products of the forest, the palm, and the cultivated field. These much-sought products give a greater *per capita* foreign trade to that small proportion of the population living in the lowlands. The growth of their population has not yet responded to the growth in their trade. Almost without exception, the natural and cultivated products of the American tropics are in increasing demand in North America and Europe, where they are required as food or as raw materials of industries. Moreover, several staples of the eastern tropics may possibly, with proper industrial conditions, be cultivated in America; and rice certainly can be, although it is now imported by every country between Cape Horn and the Arctic Ocean.

The needs of world commerce require the products that may be produced in the lowlands of tropic America. Can the population of these regions increase to meet these demands? Under the present conditions it does not promise to do so, but there are at least two ways in which it may become possible. One is by the introduction of Asiatics accustomed to similar climates. This policy the British have tried in some of their colonies, but the

independent countries of the American continent have not as yet made a success of that method.

The other means of peopling these lands is by the application of science to eliminate the tropical diseases that are now so fatal to white men and harmful to others. This is a possibility that is just arising, but which may re-discover to us the New World during the present century. Most of the particularly troublesome and so-called contagious diseases are now explained as due to or transmitted by the activity of animal organisms of various kinds. Once the danger is known it may usually be averted by combating some insect or germ, or by inoculating the person, so that the germs have no effect. Within the memory of living men smallpox has declined from the position of the world's greatest plague to a second-rate disease, due only to carelessness. Typhoid fever is known, and with care can be controlled and prevented. Millions of our contemporaries have followed the steps by which mosquitoes have been proved the guilty agents in the spread of the dread and mysterious yellow fever, and the disease has in places been stamped out completely. In the same way the sleeping sickness of Africa is now known to be due to a variety of the tsetse fly and malaria, the bane of tropics and lowlands everywhere is now explained by science as another of the insect-carried diseases. As medical science has just begun to study these questions systematically, it is fair to presume, in the light of present progress, that the time is not far distant when it may be almost or quite as easy to keep free from disease in the Mexican plains, in the Amazon or Magdalena Valleys, as in the Mississippi Valley.

If such a condition is attained, it but remains so to organize lines of transportation that travel will be easy from the hot lands to the nearest section of plateau, and so to organize society and industry that vacations for men and recreation and recuperation for women and children may be easily obtained upon some cool plateau, with which the tropics abound. There the depressing effects of long-continued heat will be avoided. In this respect it will resemble the life in American cities, from which people migrate by the hundreds of thousands in the heated season.

If society and industry can be so organized world population and world trade will experience transformations of a magnitude witnessed but once before in the history of the world—the settlement and development of the Mississippi Valley. Millions of square miles of the most fertile land will be opened to the surplus populations of Europe and America, and the seat of empire in the

tropics, as in the temperate zone, will shift to its natural place on the shores of the sea and the banks of great rivers. The present possibilities of production on these lands are no index for the future, because science has not yet been applied to tropic agriculture. If it is applied by these new populations, world commerce will surge forward because of the production of commodities that cannot be grown elsewhere and which are desired for daily use by the men of all climes.

THE ALASKAN RANGE.

A New Field for the Mountaineer.

BY

ALFRED H. BROOKS.

The Pacific margin of North America preserves a northwesterly trend for a stretch of nearly 5,000 miles, along the west coast of Mexico, the United States, Canada, and a part of Alaska; then in latitude 60° bends sharply to the southwest, as if to meet the northeastern arm of Asia, thrust toward it in the peninsula marking the eastern terminus of Siberia. Parallel to this western coast of America, and forming a mountain barrier almost unbroken from Mexico to Alaska, runs a series of mountain ranges—the Sierra Madre of Mexico, the Sierra Nevada and Cascades in the United States, the Coast Range of British Columbia, and the St. Elias and Alaskan Ranges in Alaska. Like the coast-line, the latter two, which constitute the northern portion of this barrier, make an abrupt bend to the southwest, and stretch away toward Asia. If we in the same manner follow the other great mountain system of western North America, the Rocky Mountains, in its northwesterly course through Alaska, we find that on reaching the Polar Sea it, too, bends to the west toward Siberia. In fact, this is the continental tendency, and is the topographic expression of far-reaching movements of the earth's crust.

This turning-point of the geography of the continent can be regarded as a great hinge, on one side of which the direction is North American, and on the other Asiatic; in other words, the meeting-place of the Old World and the New. Along this hinge

line rises the magnificent Alaskan Range, which lifts its snowy crests far above the other heights of North America; and almost

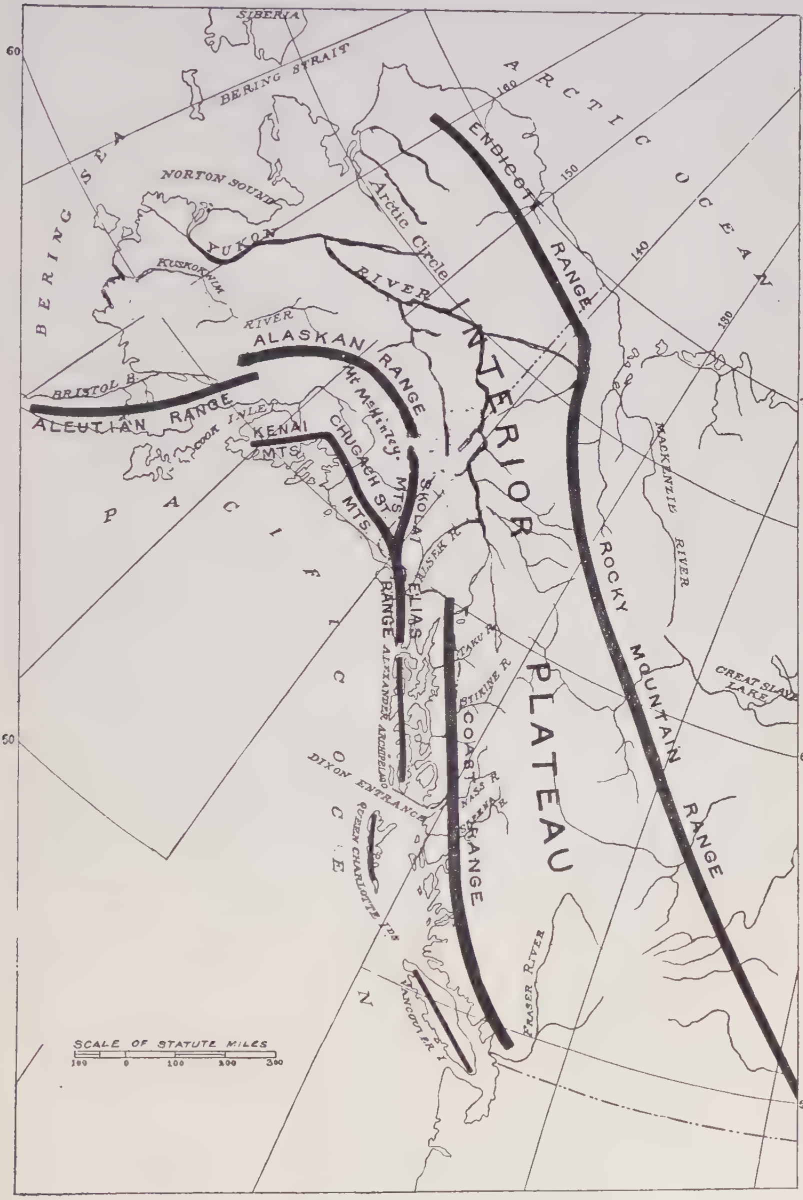


FIG. I.

at the very axial point, towering 10,000 feet above the crest-line, stands the mighty dome of Mt. McKinley, the highest peak of our

continent—just as if Nature had placed this great monument to mark the spot where the Old and New World ranges meet.

Twelve miles to the southwest Mt. Foraker rises to 17,000 feet, second in grandeur only to Mt. McKinley. These twin peaks, with three others of great height, which I have named Mts. Dall, Russell, and Hayes, after explorers of this northland, help to define the crest-line of the Alaskan Range, the watershed between streams flowing into Bering Sea on the north and west, and those that find their outlet in the Pacific on the south. Along its western front the range falls off steeply to a smooth, treeless plateau; on its southern it sinks imperceptibly through a broad belt of rugged mountains to a great timbered lowland drained by the Sushitna,

HE WHO WOULD MASTER UNATTAINED SUMMITS.

one of Alaska's larger rivers, which pours its muddy, glacial-fed waters into Cook Inlet.

Here lies a rugged highland area, far greater in extent than all of Switzerland—a virgin field for explorer and mountaineer. He who would master unattained summits, explore unknown rivers, or traverse untrodden glaciers in a region whose scenic beauties are hardly equalled, has not to seek them in South America or Central Asia, for generations will pass before the possibilities of the Alaskan Range are exhausted. But this is not a Switzerland, with its hotels, railways, trained guides, and well-worn paths. It will appeal only to him who prefers to strike out for himself, who can break his own

trail through trackless wilds, can throw the diamond hitch, and will take the chances of life and limb so dear to the heart of the true explorer.

To the big game hunter it will prove a field unequalled on this continent. He will find among the mountains the dazzling white big-horn of Alaska, while in the foot-hill region the great Kodiak grizzly, the largest bear in the world, will test his nerves. Moose abound in the river bottoms, and herds of caribou roam over the timberless plateau. Down on the lowlands the frequent ponds are

MOUNT MCKINLEY.

breeding-grounds of duck, geese, and sandhill crane, and grouse are to be found among the spruce forests; above timber-line the ptarmigan, the characteristic Alaskan game-bird, changing his plumage with the seasons, meets the eye at every turn.

Fascinating as this field will be to the explorer and hunter, yet to the mountaineer it offers a compelling challenge; for above all the giants of our western cordillera—Whitney, Shasta, Rainier, St. Elias, Logan—rises the unattained summit of Mt. McKinley, king of North American mountains. Whether seen from a distance or

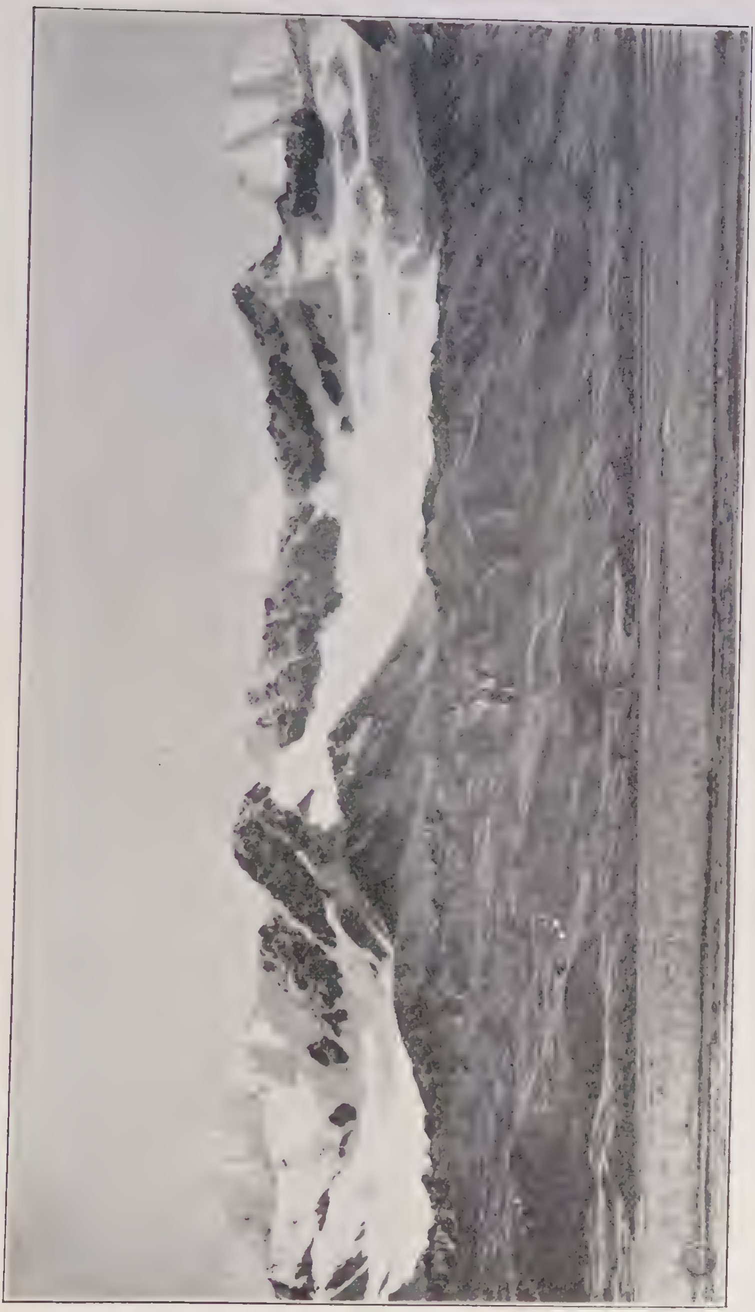
close at hand, it is ever impressive, with its 20,300 feet more than half-buried in snow. So high it towers that, in the clear atmosphere of Alaska, it is visible for nearly 200 miles in every direction, from tidewater of the Pacific on one side to the banks of the Yukon on the other.

Who shall name the discoverer of this culminating peak? No doubt the first comers to this part of the continent, evidence of whose presence is furnished by the stone implements found in the caves of the Aleutian Islands, knew the mountain, and used it as a landmark in their hunting journeys. Certain it is that the two tribes whose hunting-grounds were separated by the mountain-barrier each had a name for it long before the appearance of the first white man. The Cook Inlet natives called it "Traleyka," meaning "highest land" or "big mountain;" but to them, essentially a salmon-eating coastal tribe, and only secondarily hunters of big game, it was merely a distant point, to which they attached no especial importance.

The Kuskokwim natives, on the north side of the range, were hunters of the bear, caribou, and moose found along the piedmont plateau, and their excursions frequently led them to the very base of the mountains. What more natural than that the two imposing peaks towering above them should become interwoven with their folk-lore? The higher one they called "Teenali," regarding it as the progenitor of the great barrier which marked the limit of their realm. Their journeys through the passes of the range were few and hazardous, for beyond were alien tribes of different language, who were prone to war.

The first explorer to visit the region lying in sight of Mt. McKinley was the famous English navigator, Captain Cook. His journey around the world, begun a few days after the signing of the Declaration of Independence, brought him two years later to the mainland of what is now Alaska. Entering the great embayment which bears his name, he explored it until turned back by shallow water, deeply disappointed that it was not the long-sought passage to the Atlantic. During his brief stay at the head of the Inlet clouds must have veiled the mountains, or they would scarcely have escaped notice in his very circumstantial journal of the voyage, even though his interest lay in the waters and not in the land.

At the time that Cook explored the mainland of Alaska the Russians, striking out from Siberia, had already obtained foothold in the Aleutian Islands. Step by step their traders followed the chain eastward, harvesting the valuable sea-otter skins, of whose



SOME PEAKS IN THE ALASKAN RANGE.

worth the natives had no conception. In the course of years they spread gradually along the southern coast, and in 1783 established a colony on Kadiak Island, the first permanent settlement in Alaska. From this post, which then represented the easternmost extension of Russian occupation, the traders must soon have made their way along the shores of Cook Inlet; for when Captain Portlock, one of Cook's officers, visited the Inlet in 1787, he found the Russian traders already in possession, though without as yet any permanent habitation.

It is fair to assume that these Russian traders were the first white men to behold Mt. McKinley, whose towering summit is visible from many points at the head of Cook Inlet. Even they, savage to barbarity and cruel almost beyond conception, with but one thought in their minds—furs—were sufficiently impressed by the mountain to give it the name "Bulshaia," meaning "big mountain." As such it was known in Russian literature; but, strange to say, references to it were few. During the three-quarters of a century that the Russians held sway occasional exploring expeditions visited the coast, and some penetrated Cook Inlet. One of these was led by George Vancouver, who in 1794 had assumed the task of extending Cook's surveys. Vancouver appears to have caught a glimpse of the Alaskan Range, for he makes mention of "distant stupendous mountains." This is the first definite reference which I have been able to find to these high mountains, though it is quite possible that they are mentioned in some of the older Russian narratives.

When, in 1834, Malakof, an employee of the Russian-American Fur Company, which controlled all of Alaska, made an ineffectual attempt to ascend the Sushitna River, he must have been in sight of Mt. McKinley as he dragged his clumsy Russian boat against the swift current; but his mission was to find virgin fields for the fur trader, and he seems to have paid no heed to the mountain.

After Russian America became a possession of the United States, in 1866, the fur trader continued his vocation on Cook Inlet, and still we find almost no mention of Mt. McKinley. In the course of time a few hardy pioneers, chiefly traders and prospectors, made their way inland across the coastal barrier and explored the Yukon basin. Little is known of their journeys, which must have been accomplished with great difficulty, but there is evidence that they saw the mountain, though only at a distance; and stories of its stupendous height were told in many an isolated trader's post and around many a lonely camp-fire. Such rumours, however, did

not reach the outer world in sufficiently definite form to be noted by cartographers.

Thus as the years rolled on this high peak was known only locally to whites, not one of whom recognized the importance of calling the attention of geographers to its position.

In 1886 Lieut. (now Major) Henry C. Allen, U. S. A., since grown prominent in the Philippines as chief of the constabulary forces, was sent to Alaska, at his own suggestion, to explore the Copper River. Fascinating as would be a description of his daring journey, hardly equalled in the annals of Alaskan exploration, we are concerned only with his observation of Mt. McKinley. While making his dash down the Tanana in a flimsy skin boat, half-starved, Allen persistently kept up his topographic notes. He records far to the south of his route a rugged, snow-capped range, and he sketched in profile the several peaks of exceptional altitude. Allen was, however, 150 miles away, and could not realize that he had looked upon the highest peaks of the continent.

The finding of gold on Cook Inlet in 1894 quickly wrought great changes in its population. The trader who was content to remain at his post and wait for the natives to bring him furs for barter was succeeded by the restless prospector, who, following the traditions of his class, struck out in search of new fields. Some pushed their way up the Sushitna, and must have obtained glorious views of the Alaskan Range; but they were seeking gold, and were little interested in the cause of geography, until, in 1896, W. A. Dickey was struck by the stupendous height of the largest in the group. Though he was probably no nearer to it than a score of others, he seems to have been the first to recognize its geographic importance. Without instruments, he made a bold guess that it exceeded 20,000 feet in altitude, and had the enterprise to give it the name "Mt. McKinley" and to make public his observations.

The world at large paid little heed to this discovery, looking upon it as just another of the wild tales which emanated from Alaska. But at the same time that Dickey was stemming the mad current of the Sushitna an event occurred which was destined to change Alaska's position in the mind of the world—the Klondike gold was discovered. Then it was that the Federal Government awakened and attempted to make up for its long neglect of this vast domain. Money was appropriated to develop its resources, and among the various departments enlisted for the work the United States Geological Survey was enabled to begin the series of

explorations which has been extended during the past seven years to some of the remotest parts of the Territory.

Of the six Survey parties despatched to this new field in the summer of 1898, one, led by George H. Eldredge and Robert Muldrow, held its course up the Sushitna River, hoping to cross the range and reach the Yukon basin beyond. But this was no easy matter. After dragging their heavily-laden canoes against the swift current to the source of navigation, they struck out on foot, each man shouldering as large a pack as he could carry. A hundred miles' march brought them across the divide, only to find their way barred by a river and their provisions so low that they were forced to turn back, half-starved and worn out with the hard work. They had not reached the Yukon, but their triangulation surveys along the river had located and determined the height of the high mountains to the west, substantiating Dickey's phenomenal estimate.

In the face of similar difficulties, two other parties carried surveys within the shadow of the Alaskan Range—one, under J. E. Spurr and W. S. Post, up a western fork of the Sushitna, and down the Kuskokwim to Bering Sea; the other, led by W. J. Peters and myself, up the White River and down the Tanana to the Yukon. Both expeditions gained valuable knowledge of the location and character of the range, though their routes lay far from the two great mountains at its heart.

These three explorations of 1898 had blocked out an area of about 50,000 square miles, within which lay the high peaks. Mt. McKinley was gradually becoming something more than an Arctic myth. In response to the demand that now arose for further information, the army entered upon the scene in the person of Lieut. (now Capt.) Joseph S. Herron. With five white men, two Indian guides, and fifteen horses, he landed on the north bank of the Keechatna early in July, 1899, and struck out westward toward a pass in the mountains which lay to the north of the one discovered by Spurr. All went well with Herron until he had traversed the range, which took his Indian guides to the limit of their hunting-grounds, and hence their knowledge. Frightened at the prospect of entering the great unknown beyond, the two valiant warriors stole away one night and left the expedition very much perplexed. Resolving to push on, however, they followed the course of the Kuskokwim, previously surveyed by Spurr, and, after many hardships—scarcity of grass, shipwreck on a raft, the loss of provisions, the many obstacles to their progress—they were at last found by

natives, and led to the army post at the mouth of the Tanana. The journey which had been planned for a summer's trip had taken them nearly six months. They had approached within 50 miles of Mt. McKinley; and, first of white men, had seen its northern base.

Herron's exploration, even though he was unable to carry on any instrumental surveys, reduced the size of the unknown area, but as yet no one had actually set foot upon the mountain. After the miscarriage of Herron's plans, it was for some time deemed impossible to make the journey from the Pacific waters to the Yukon, along the base of Mt. McKinley, within the short summer of this northern region. Three years' cumulative experience of the country, however, convinced the Geological Survey authorities that it

GLACIER IN THE HEART OF THE ALASKAN RANGE.

could be done, and the burden of proof was assigned to a party under my leadership, with D. L. Reaburn as topographer and L. M. Prindle as geologic assistant. The story of our summer's journey I have told elsewhere; merely an outline will serve our purpose here.

We left Cook Inlet about the first of June, with 20 horses, carrying 105 days' provisions and equipment for our party of seven. A month was spent traversing the great swampy lowland lying between tidewater and the mountains. The horses were swum over three rivers, and forty miles of trail were chopped—the latter no easy task for so small a party. Meantime our worst hardship, the mosquito

pest, so wore upon the strength of man and beast that it seemed at times as if our project would have to be given up at the outset.

The middle of July, however, found us traversing the Alaskan Range by a pass we had discovered, lying between Herron's Pass to the north and Spurr's to the south. After gaining the western slope we laid our course northeast close to the mountains, thus avoiding the lowland, which had proved so disastrous to Herron. Many swift glacial rivers surged athwart our line of march, each presenting its own problem of crossing; but finally, at the end of the second month of hard travelling, we pitched our camp at the base of Mt. McKinley, only 15 miles from the summit. On that day, when I stood at snow-line on the flank of the mountain, within nine miles of the top, the first white man to approach the highest peak on the continent, the first to behold the rugged grandeur of its snow and ice covered mass, all the dangers and hardships which we had encountered seemed a small price to pay for such an experience.

Our mission of exploring and surveying did not permit us to attempt the summit, which loomed temptingly 17,000 feet above our camp. With the season over half-spent there was no time to linger; we must on to the Yukon. After a journey full of interest we reached the banks of that river on the 15th of September, having traversed 800 miles of unexplored region, and swum, forded, or bridged nearly two score rivers and streams. An instrumental survey, thanks to Reaburn's indefatigable energy, was carried on throughout the journey; and this expedition completed the exploration of the west front of the range, as Eldridge's had the east front four years before.

Reports of our experience awakened no little interest among those possessed of a taste for exploring, and plans were soon projected to ascend the mountain. Mr. James Wickersham, one of three district Judges of Alaska, was the first in the field. Those who may think such a feat rather an unusual undertaking for a member of the highest tribunal of the Territory should eflec t that the life of a judge in this frontier region is by no means comparable to that of his colleague in a more civilized community. Every year Judge Wickersham travels thousands of miles—by steamer and horse in summer, by dog-team and sleigh in winter. His position, therefore, requires not only legal training but also power of endurance; and it was not an unnatural impulse that led him to undertake this journey of hundreds of miles into an almost unexplored region between his terms of court.

No circumstantial account of Wickersham's journey has ap-

peared in print, but it is known that he reached the base of the mountain after a long journey from the Yukon by steamer and pack-train. Failing in his attempt to reach the summit, he made his return through a series of thrilling experiences, covering part of the journey by raft.

About the time that Wickersham had resumed his official duties, Dr. Frederick A. Cook, of Arctic and Antarctic fame, landed at Tyonek with a small party of men and horses, including Fred Printz, who, as packer of our party the preceding year, had shown a resourcefulness which contributed largely to the success of our expedition. Reaching the base of the mountain by the trail which we had established, Cook made a valiant but unsuccessful attempt

A MOUNTAIN VALLEY.

to reach the summit. His most important results were realized on the return journey, made through the very heart of the range—a daring piece of work, which furnished a valuable contribution to geographic knowledge.

But Mt. McKinley still remains a challenge to the mountaineer. There is still a splendid field for the explorer, for, besides the two monster peaks whose summits have yet to be scaled, there are a score of lesser height. It will be strange indeed if some American does not take up the challenge now that the path is broken to this highest range on the continent, which in the past six years has emerged from the clouds of myth and stands an actual reality.

A PHOTOGRAPH OF MOUNT EVEREST.

This photograph, which is taken from the *Geographical Journal* (May, 1905), is the only one that gives a good idea of the highest summit of the world. Where the mountain has been observed from India or Nepal, in every case at a distance of 60 to over 100 miles, it is so nearly surrounded by other mountains that only the top of it can be seen. Every point of view from the south gives only a faint idea of its elevation.

The picture here shown is the first to be taken from the north

MOUNT EVEREST FROM KHAMBA JONG.

side of the Himalayas; and though the camera was 105 miles from the mountain, the photograph shows in a striking manner the configuration of Everest.

The photograph was made at Khamba Jong by Col. Younghusband during his four months' residence at that Tibetan fort in the summer of 1903. This region in southern Tibet had been hitherto inaccessible to white men. Col. Younghusband writes with enthusiasm of the wonderful view of Everest revealed from this point of vantage:

Every day and every hour enjoying the charming summer climate, and, above all, the unrivalled

panorama of the mighty Himalayas at the very culminating point of their grandeur, where all the loftiest peaks in the world were majestically arrayed before us. . . . As I looked out of my tent in the early morning, while all below was still wrapped in a steely gray, far away in the distance the first streaks of dawn would be just gilding the snowy summits of Mount Everest, poised high in heaven as the spotless pinnacle of the world. By degrees the whole great snowy range would be illuminated and shine out in dazzling, unsullied whiteness. Then through all the day it would be bathed in ever-varying hues of blue and purple till the setting sun clothed all in a final intensity of glory, and left one hungering for daylight to appear again.

Captain Wood stood 45 miles nearer to the mountain last summer than the place where Younghusband's camera had been set up the previous season; but Wood was on the south side of Everest in Nepal, and what he saw there inspired merely the laconic remark that "from this place Mount Everest is an insignificant point just visible in a gap of the main range."

Perhaps the most important information brought by the party which Captain Rawling led due westward, when the British expedition was returning from Lhasa to India last year, was that there is no mountain nearly so high as Everest to the north of it. It is probable, therefore, that Mount Everest will always have the distinction of overtopping every other peak.

COMMANDER PEARY'S START FOR THE ARCTIC.

The Peary polar expedition on the new steamer, the *Roosevelt*, started on Sunday, July 16, from its anchorage in the North River, for Sydney, C. B., the Smith Sound channels, and the Arctic Ocean. On July 11 the sealer *Erik*, which had been chartered as an auxiliary vessel, left Sydney for Smith Sound with 600 tons of coal and a supply of whale pemmican that had been prepared for Mr. Peary, for dog food. The *Roosevelt* left this port with full supplies for two years, a complete equipment for the exploratory work, and 400 tons of coal. The buoyancy of the vessel fully met Mr. Peary's expectations, and this was especially gratifying, as fears had been expressed that on account of the great weight, in proportion to its size, of the hull, heavily strengthened, as it is, at every point, her cargo carrying-ability would be much reduced. These fears, however, have proved to be groundless.

During the last few days of preparation the funds at the disposal of the explorer were increased by contributions from a number of gentlemen and by benefit performances given by the Boer War Exhibition at Coney Island to the amount of over $51,000, and he was thus able to make many very desirable additions to his equipment which otherwise he might have been compelled to forego.

It is due to the munificence of Mr. Morris K. Jesup and other members of the Peary Arctic Club, Mr. George Crocker and other private contributors that the Peary expedition has started north with a splendid ship and adequate resources of every kind. Of the $51,000 above mentioned, Mr. Morris K. Jesup contributed $25,000, Gen. Thomas H. Hubbard $10,000, and the Boer War Exhibition $500. The fact is also now made known that in January last Mr. George Crocker contributed $50,000 to the fund.

When he left New York, Mr. Peary expected to take on about 200 more tons of coal at Sydney, where Captain Bartlett, who will command the *Roosevelt* under Mr. Peary's orders, will come aboard with his Arctic crew. The explorer is accompanied by his former assistant Matt Henson, Charles Percy, his old steward, Dr. Louis J. Wolff, physician, and Rosse Marvin, geologist. The crew will number 15 men. The full roster of the expedition, as it leaves Sydney, will be printed in the BULLETIN later. The explorer is accompanied by his family as far as Smith Sound.

Mr. Peary expects to arrive in the Smith Sound region early in August, and will there add walrus to his supply of dog food. He will take on board the *Roosevelt* all the Smith Sound natives who can be utilized, together with their dogs. He will depend entirely upon these Eskimo dogs to haul his sledges. On his way north through the channels leading to the frozen sea he will probably establish supply depots at Fort Conger, Cape Lawrence, and Cape Frazer. If the ice conditions in the straits prove to be bad, everything possible will be done to force a passage through, the *Roosevelt* having been specially built to do the hardest kind of ice work; and dynamite will be used, where necessary, to open a channel.

The explorer hopes to spend the dark months of next winter on his ship, probably near the coast of Grant Land, with his Eskimos camped on the neighbouring shore. Meteorological and magnetic observations will be carried on during the winter, and the preparations for the sledge journey to the North Pole will fill many of the waking hours.

As soon as there is sufficient light in February the pioneer sledge party of Eskimos, with a leader, will start over the sea-ice and will quickly be followed by the main body. There will be from twenty to twenty-five sledges in the two parties, with six or eight dogs to a sledge. The scientific instruments on this journey will be those required to take observations for position, thermometers, and sounding apparatus. The journey to the Pole and back again to the land-base will be about 800 miles, and,

if good fortune attends his enterprise, Mr. Peary thinks that he should rejoin his ship some time in June next year. If he succeeds in reaching the Pole during the spring sledging season of 1906, he will be ready to start for home as soon as he returns to the vessel, will try to force his way southward to the open water below Smith Sound, and should reach this city by September or October, next year, fifteen or sixteen months after the *Roosevelt's* departure from New York. A prize fund of $25,000 will be distributed among Peary's men if the Pole is attained and the expedition returns to New York within eighteen months.

If, on the other hand, he does not succeed in reaching the Pole next spring he will make another attempt a year later. It is hoped, in fact, that before circumstances compel him to return home he will have a sledging season so favourable for his undertaking as to enable him to achieve the task before him.

The *Roosevelt* attracted much attention after her arrival in New York. She came from Portland, Me., in charge of Commander Peary, and reached her anchorage off Forty-second Street, North River, on Sunday, July 2. She came under steam, and on the way along the New England coast gave evidence of her sea-going qualities and manageability that was in the highest degree gratifying to the explorer and the officers and crew. She made ten knots an hour, drove easily and with little rolling, and responded quickly to every turn of the wheel.

On July 3 the *Roosevelt* was placed in a dry dock in Hoboken, where the hull was cleared of the barnacles and other material that had become attached to the bottom, and a few more bolts were put through the prow, and the vessel then returned to her anchorage in the North River.

A number of persons improved the opportunity while she was in the dry dock to study the model of the fourth vessel to be especially built for polar exploration. The *Roosevelt* resembles the *Discovery* more than the *Fram* or the *Gauss*; but she is egg-shaped rather than kettle-bottomed, her stem has about ten degrees more rake, or, in other words, she has a more slanting prow than the *Discovery* and a rounding form that can nowhere be grasped by the ice.

There is little to add to the brief description of the vessel that was printed in the BULLETIN for April (p. 220). It may be noted, however, that the beams and bracing of the sides to resist pressure are unusually massive, and the vessel is filled in almost solid for ten feet back of the bow, where it meets the impact of the ice.

The rudder is so adjusted that it may be lifted out of danger from contact with the ice, the stem and bows are armoured with heavy plates of steel, and the outer planking is protected by a 2½-inch course of greenheart ice-sheathing. The vessel has a three-masted schooner rig, carries fourteen sails, and has a sail area somewhat less than that of a three-masted coasting schooner of the same size. Her gross registered tonnage is 614 tons and her maximum load displacement is about 1,500 tons.

Peculiarities of the machinery installation are: a compound engine of massive construction; an unusually heavy shaft of forged steel, 12 inches in diameter; a massive propeller, 10½ feet in diameter but with blades of large area, which are detachable in case of injury, and extra blades are carried; a triple boiler battery; arrangements for admitting live steam to the low-pressure cylinder, in order to increase the power largely for a limited time; an elliptical cruiser type smokestack, to reduce wind resistance.

The best quality of material and labour have been put into the ship, and it is believed she is the strongest and ablest ship ever built for Arctic exploration.

On Thursday afternoon, July 6, a large number of ladies and gentlemen, on the invitation of the Peary Arctic Club, took a trip on the *Roosevelt* down the bay as far as Fort Wadsworth and back to the anchorage. All the shipping in the harbour saluted the new Arctic steamer, and the whistle of the *Roosevelt* was in constant commission replying to these courtesies. The guests had ample opportunity to look around the little vessel. They could easily see that the vessel had been built for the sternest utility, that not a cent had been used for ornamentation, and that all thought and energy had been given to making her staunch in every timber and comfortable for the men.

The deckhouse amidships has small rooms for the commander and officers, besides kitchen, dining-room and chart-room, with a few bunks in the passageways. The wheel is on the roof of this cabin forward, the crow's nest is at the top of the central mast, and the quarters of the crew are in the forward deckhouse. Some of the guests went down into the hold to get a better idea of the remarkable system of beams and braces that would seem to render the vessel practically uncrushable.

The guests were received by commander and Mrs. Peary as they came aboard, and refreshments were served during the four hours of the sail. Among those present were Rear-Admiral J. B. Coghlan and Mrs. Coghlan, Brig-Gen. F. D. Grant, Henry G.

Bryant, President of the Philadelphia Geographical Society, Prof. William Libbey, of Princeton University, Madison Grant, President of the New York Zoölogical Society, Prof. Angelo Heilprin, of Philadelphia, Col. David L. Brainard, of the Greely Arctic Expedition, Amos Bonsall, sole survivor of the Kane Expedition of 1853–5, Dr. Henry M. Leipziger, Supervisor of the New York Free Lecture Course, and Mr. Banyer Clarkson and Mrs. Clarkson.

MAPS: THEIR HANDLING, CLASSIFICATION, AND CATALOGUING*.

BY

THOMAS LETTS,

Map Department, American Geographical Society.

It has appeared to me that a presentation to this Congress of the methods adopted by the American Geographical Society in its map-room, and the reasons for their adoption, might prove interesting, if not instructive. There is no intention or desire to urge upon others the plans which we find practical, as we are fully aware that in the internal organization of any institution there may be causes at work to prevent or to modify the use of systems otherwise desirable.

Most librarians receive their maps in three broad groups, *i. e.* (1) flat sheets *unmounted* (as issued by private firms or Government institutions); (2) *folded*, either with or without protecting covers or cases, mounted on muslin or cloth, and sometimes dissected or cut up into sections, allowing them to be folded without detriment to the map; and (3) on *rollers with ledges*, generally mounted or backed with muslin, sometimes without either mounting or rollers, but at any rate as roller or rolled maps.

Reverting to the subject of Classification, it may be conceded that the choice of a system—numerical, alphabetical, chronological, or topographical—is only a matter of personal preference, so long as the catalogue entry corresponds with the map.

There are several very distinct groups into which sheet maps may be divided: 1st, the general collection of individual maps; 2nd, sets of sheets on a uniform scale of a country, a county, parishes, cities, or towns, bearing their own series of numbers and

---

* A paper read before the New York meeting of the Eighth International Geographic Congress in September, 1904.

system of identification, such as the various surveys of the Ordnance Maps and Plans of Great Britain and Ireland, Germany, France, Italy, Russia, etc.; 3rd, Charts (on varying scales) as issued by nearly every European maritime country; 4th, maps periodically issued by Government or by private publishers of given areas of country or groups of countries, as the beautiful map of Eastern Asia now being produced by the French "Service géographique de l'Armée" on the scale of 16 miles to the inch; and others, which will doubtless be known to you; 5th, Atlases also published in parts and extending over many years (as Stieler's Hand-Atlas), which are always kept by themselves, and are not mixed up with the countries or parts of countries to which they geographically or politically belong. For these we retain the system of identification provided by their producers, as nothing would be gained by departing from such arrangement. Inasmuch as the individual map in every good atlas has a card for itself with its proper reference number, it can readily be found, whether unbound or bound. The effort should be to place the map before the reader in an easy form for reference, and this does not favour the binding of sheets in a book, which is not so convenient for consultation as the flat or sheet form. With these principles, therefore, to guide, sheet maps are arranged in manilla paper wrappers chronologically as regards a particular country, alphabetically as regards the subdivisions of it; and all the countries of a continent are grouped together in A B C succession: thus the whole Continent of America, North America, and Canada occupy tier No. 1 of our sheet cases, whilst No. 2 is assigned to the United States in general, followed by each State in A B C order; with Mexico and the West Indies in their place.

Now, in the handling of a sheet map, it is desirable, as far as possible, to avoid folding it. Every time a folding map is opened and closed it is weakened, and at last it cracks at the folds. It is obvious economy to have the map cut at the fold and a linen joint pasted up the back. This does not prevent the most critical examination of the finest workmanship, while it undoubtedly lengthens the life of the engraving.

Our cases or boxes for holding the sheet maps are made as long and as deep (from back to front) as can be conveniently handled. Their internal measurements are: 41 inches in length by 27 inches deep (from back to front), and the height is 3 inches. The case is laid on a sliding frame, and, once in place, it is not moved. It is opened by raising a hinged five-inch lid, which allows the front to fall and leaves the box open. This arrangement gives the

lightest possible receptacle with the greatest strength in the only part used—the hinge. It is found that a tier of eight cases provides a good working top at a convenient height from the floor.

The particular pattern of case used has been found thoroughly satisfactory in meeting all requirements—viz., facility of handling with a minimum of friction, and a practical immunity from dust. Such a case has long been a desideratum in every office where maps and plans have to be preserved; and the evils attendant on the old methods of open shelves (sliding or fixed), drawers (with or without spring backs), curtains or other devices for dropping fronts (as recently introduced into the Library of Congress), portfolios of any kind (on movable racks or otherwise), need no more trouble the long-suffering mortal who has the care of maps, plans, or prints of any kind.

Of all forms in which printed documents can be presented to us that of the bound book is undoubtedly the most convenient for consultation and for storing, and the nearer we can bring our maps to that condition the better for the reader, the librarian, and the map itself. All probably know from experience how difficult it is to keep track of sheets of paper, prints, drawings, plans, or maps. Maps should be dissected and mounted to fold as books; they can then be handled as books, and need no special section of the map room to contain them. In like manner, if this class of map is presented to the library, preserve it as it is given, and do not throw away its case and lay the map amongst your sheet stock.

With regard to rollers or rolled maps in any form, the system which most recommends itself is the following: Enclose and cover at top and front a long strip of wall, 12 inches deep from back to front, and of length to suit requirements; about 14 inches from the floor have a wooden framework, made in the nature of a bottle-rack or umbrella stand in divisions of 12 inches square or thereabouts, and above it about 42 inches from the floor another framework of the same dimensions, but with the front opening on central points, to enable the rollers to be placed (not lifted) in or out.

These divisions can be made to answer to one or more letters of the alphabet, and the maps can be kept strictly in A B C order, as in the catalogue (and not according to countries, as the sheet maps); the quantity required being too small to justify the topographical arrangement.

Our Society has adopted the chronological system, making the date or year of issue the main guide for arrangement. This may be illustrated by the boxes devoted to the State and City of New

York. Maps of the State, or large divisions thereof (not specifically named) are placed in chronological order and marked in pencil on the bottom right-hand corner with a date (an arbitrary one, if none can be found, and of course the same date on the card), and laid in one or more folios in strong manilla paper (averaging not more than 25 sheets, or equivalent thereto in a folio, a single map folded in half being counted as two), the outside of the folio marked to agree with the chronological contents, as 1670–1720. These are arranged with the oldest date at the bottom. If two or more maps bear the same date, descriptive information is added (as the name of the publisher or compiler).

It is a good plan to place the date in bold figures in the centre of the wrapper. No matter how many maps are added, the chronological arrangement can always be preserved, without alteration of the card, until the box is filled.

Medium collections of maps of counties, townships, or cities are arranged primarily in alphabetical and then in chronological order, so that Albany City, Albion County, Black River Canal, Black Rock Village, and Buffalo all follow one another in the folio, and if there are two or three different dates to any subject, they are then arranged chronologically, the newer editions being at the top. In such a case as New York State, the City of New York has one or more folios to itself, and they are catalogued by themselves.

In taking up the subject of "Cataloguing," it must be said that cards with printed guides are admirably effective as compared with the older blank cards, which called for no analysis of essential particulars.

In practice the printed cards have been found advantageous by confining the special information desired to particular spots on the card. The top line is left blank for the insertion of the name of the map or subject and the section or shelf to which it is assigned. The next four lines have been found sufficient to give the exact title, or such general description as will complete identification (in the absence of a title). Then follow the place, the publisher, and lastly the date. Now many maps give none of these particulars, in which case they must be supplied within brackets and with interrogation marks; above all, a date of some sort must be given, as the whole plan of the system is based upon the chronological arrangement.

As to the question of size. This is a matter of great importance for identification and definition, and it should not be left open to

question. The British Museum Catalogue of Maps omits size altogether. The Catalogue of the Library of Congress says "the measurements of the maps are in inches;" but, as a matter of fact, it does not say whether the measurement reads first horizontally or perpendicularly; nor does it say whether it includes the border, and consequently no correct mental picture of the map can be formed. The Catalogue of the British Admiralty Charts gives a table at the back of the title-page, wherein are shown the abbreviations used for recognized sizes of paper, with their measurement in inches; but nothing is said as to how much of the paper is covered by the printed map; though, as a matter of fact, very little margin is wasted by the Admiralty.

The Catalogue of the United States Hydrographic Office (which supplies specially-engraved copies of the charts of all nations for waters not within the jurisdiction of the United States) gives no indication of size; whilst the United States Coast and Geodetic Survey gives "Size of border—inches," but, unfortunately, adopts no uniform rule in its measurements, the first figure sometimes referring to the width across, and sometimes to the height from top to bottom.

A catalogue description should be as concise and as correct as possible, and the facts given should be those best calculated to enable the consultant to identify the map by the description. In our Society's catalogue the measurements always mean the map within the border, and they are to be read horizontally first (as we ordinarily read) and then perpendicularly. To emphasize this we affix to the measurements the arrow-heads used on surveyors' and architects' plans → ↑ .

In preference to the metric system we have adopted inches for our standard, as more generally understood by our readers.

If the matter of size is important, the subject of "Scale" must be regarded as the most vital feature of any map or chart; and yet even this has not been uniformly adopted in the British Museum Catalogue, or in that of the Library of Congress; though all three Catalogues of Charts, to which I have already referred, do state very clearly on what scale their work is engraved. The house of Perthes, in Gotha, was probably the first to mark on the table of contents the scale, not only of the main map, but also of the inset or subsidiary plans or maps, and it is only now that other publishers are adopting the plan. It was a matter of considerable discussion as to what principle should guide us in the expression of scale; and while we finally adopted the interchangeable unit of miles to the

inch, or the inch to the statute mile of 69½ to one degree for maps (and the nautical mile of 60 to one degree for charts), we think it not unlikely that countries which do not use the English language and measurements will prefer the fractional or decimal system of the proportion which the drawn map bears to nature; as $\frac{1}{63360}$=1 inch to the mile; or 1:63,360, an equation intelligible to the scientific of all nations.

Returning to the card. After the word "Engraved" we add the words "on copper, wood, stone, steel, by wax process," as the case may be; and, when possible, the name of the engraver is added, as in the older maps that is often the only means of identification. If the map is a copy of a manuscript, or one produced by photo-lithography or zincography, the fact is noted. Nearly all maps are primarily issued plain or uncoloured, so that the printed word "plain" suffices to state the normal condition of the map; if, on the other hand, the map is coloured, the words "by hand," or "printed in colours" are written in. The last line of all usually stands as printed, but frequently we add the sheet No. (as in a series of charts), or folio No. if in an atlas, or mark it out and indicate the form in which the map is in stock, as "muslin, dissected to fold," "roller and varnished," etc.

The subject here outlined will be found treated *in extenso* in an article published in the Library Journal, Vol. 27, 1902, pp. 74–76.

GEOGRAPHICAL RECORD.

AFRICA.

THE MASAI TO BE PLACED ON RESERVES.—It will interest all who remember that the great African steppe between Mount Kilimanjaro and the Rift Valley remained unexplored for many years because of the wandering Masai herders, who regarded all strangers entering their country as enemies, to hear that this superior people have so completely yielded to the British influences now predominating that they have consented to give up a large part of their territory and settle on reservations that have been selected for them. Sir D. Stewart was sent to East Africa, under instructions from the Secretary of State for the Colonies, to make full inquiry into the Masai question. Meetings were convened at which the British officials and the chiefs of the various branches of the Masai tribe were present. The result is that, with the unanimous consent of the chiefs, special areas are to be reserved for the tribe.

The northern and larger section of the Masai have agreed to vacate the Rift Valley and settle in only a part of the area they have so long occupied. Another region farther south has been assigned to the rest of the tribe. The boundaries of the reservations have been distinctly defined, and are now being marked out. A

Government station will be built in the northern reserve, where an officer, specially selected as a person who is acceptable to the Masai, will reside. The tribe will remove to their new settlements as soon as the necessary preparations are completed, and the extensive pastures vacated by them will then become available for European occupation.

DECLINE OF THE NIGER DUE TO FALLING WATERS.—The French explorer Fourneau says that the Niger is now showing more evidences of the desiccation that is gradually spreading over large parts of Africa than any other large river. It is the run-off for the waters of a great part of the western Sudan, where the decline in rainfall has been uncommonly marked for a considerable period.

The French officers Toutée, Hourst, and Fourneau proved the possibility of carrying supplies from the mouth of the Niger to the upper river, in spite of the long stretch of rapids about 500 miles above the delta. Hundreds of tons of freight have thus been distributed from the ocean among French posts in the western Sudan, and as late as last year some supplies were still forwarded by this route; but this highway to inner Africa, hailed as a great discovery when the French declared its practicability, has been abandoned this year. The water is so low in the rapids that no boat can get over the rocks.

At Timbuktu the French report that the water-level is slowly but steadily sinking. This is very apparent among the islands that divide the Niger into many channels from 100 to 300 miles above Timbuktu. As long as we have had knowledge of these islands some of them have been completely covered at high water, so that the native inhabitants have been compelled to make an annual sojourn on the mainland till the fall of the floods. Not a single island is now abandoned, for none of them is covered even when the flood is unusually high.

Fortunately for the French, they have completed their railroad from the Senegal River to the upper Niger, giving a new inlet to their Sudanese possessions.

THE BRITISH ASSOCIATION IN SOUTH AFRICA.—The meeting of the British Association in South Africa, late in August and early in September, will be especially notable as the first meeting of a European scientific body in South Africa. It will be the seventy-fifth assembly, and under the presidency of Prof. G. H. Darwin. The programme will involve a great deal of travel in that part of the British Empire, for the meetings are to be held in seven widely-separated centres, to say nothing of the excursions. The sessions will be held in Cape Town, Durban, Pietermaritzburg, Johannesburg, Bloemfontein, Kimberley, and Bulawayo, and arrangements are being made in each place for receptions and excursions.

The officers and invited guests will number about 200, and many of the ordinary members are also expected to attend. The meeting will be opened at Cape Town on Aug. 15, when the presidential address will be delivered in the evening. The session there will last four days, shorter visits being made to other cities. A limited number of the members will make the journey from Bulawayo to the Zambezi to visit the Victoria Falls. Mr. G. W. Lamplugh is going to the Falls in advance to study the question of their geological formation, and it is likely that he will present a paper on the subject before the Geological Section. A party of specialists will also make an excursion to the ancient ruins of Zimbabwe.

Nature says that the South African Association for the Advancement of Science is preparing a handbook which will be a general review of the various branches of scientific activity in South Africa, the articles being contributed by actual workers in these subjects in that country. A copy of the book will be presented to each member of the British Association before leaving England.

THE ISLAND WORLD.

CELEBES JOINED WITH THE OUTER WORLD BY CABLE.—The German newspapers announce that the cable steamer *Stephan* has completed the laying of the cable between Menado (at the northern end of Celebes), Yap (at the west end of the Caroline group), and Guam. The German–Dutch Telegraph Company of Cologne owns the cable. Its length is nearly 2,000 miles, and the greatest depth attained was 2,300 feet. Menado and Macassar, the one in the northern and the other in the southern peninsula, are the two largest marts in Celebes. Menado is situated in one of the richest and best-cultivated districts of the Dutch East Indies, and has become prominent with the growth of the coffee industry, which was not introduced into the island until 1822. Yap is the most important island in the Carolines (German), and the collecting and distributing point for the trade of that group. The fact that those parts of the Pacific are now connected with the American line, giving them telegraphic communication with the rest of the world, will end their isolation and give an impetus to their development.

NEW ISLAND IN THE PACIFIC.—A few more particulars have been received concerning the new island that suddenly came into existence in the Pacific late last year, as briefly reported in the newspapers in January. The island has been named Nii Shima, and it stands in the small group known as the Volcano Islands, a little south of 25° N. Lat. and east of 141° E. Long. Its growth and the disquieting phenomena that accompanied it were watched by the natives of the islands Iwo and Sulphur, who did not pretend to enjoy the violent spectacles they witnessed.

The island, which is one of the latest accessions to the Japanese empire, is said to be 480 feet high and 2¾ miles in circumference. The first intimation of something unusual occurred on Nov. 14, when the natives above mentioned heard strange rumblings that they could not account for. Two weeks later clouds of black ash and steam, or, as the natives said, of black-and-white smoke, filled the sky to the east, and the sea looked to them as though it were on fire.

When the smoke partly cleared they saw what they thought was an island about 12 miles away. A little later there seemed to be three islands, and on Dec. 12, instead of three islands, one large island was plainly in view. It changed its form to some extent from day to day, and the spectators were anxious to know what would happen next. Finally, ten men summoned up sufficient courage to set out for the new island in a 30-foot boat and a canoe.

They reached the island on Feb. 1. They reported that the south coast was a precipitous mass of rock and they were unable to land there. The slope was gentle on the north, and they found there a boiling lake. They succeeded in reaching the top of the island and planted a flag with the inscription: "New Place. Great Japan. Many Banzais." The new island stands on the line of weakness in the earth's crust that is marked by volcanoes all the way from Fiji to the Bonin Islands.

A VISIT TO THE PEOPLE OF A LITTLE-KNOWN ISLAND.—Mr. Walter E. Roth, an ethnologist of Brisbane, Queensland, and also the Government Agent having supervision of the native tribes of that State, has recently visited Mornington Island, which lies about 30 miles from the southern coast of the large, shallow Gulf of Carpentaria, off northern Queensland. The fact that this island, which is about 35 miles long and from 10 to 18 wide, has never been explored is due to a number of circumstances. The island was discovered 103 years ago by Captain Flinders, who named its leading promontory Cape Van Diemen. A number of small islands are scattered around it, and years ago the British gave the name of Wellesley

Islands to the whole group and called the largest of them, which is also one of the larger islands of Australia, Mornington Island, after the second title of the Marquis of Wellesley.

The best maps show the outline of the island, but give no indication of its topography except to print through the middle of it the words "About 300 feet high." It remained cut off from the world's interests because it stands at the bottom of a great gulf hundreds of miles from the shipping that passes through Torres Strait and equally distant from the nearest enterprises in Australia. The neighbouring coasts of the mainland are very swampy, and Leichhardt is the only Australian explorer who ever came within 50 or 60 miles of it. The gulf is so shallow that large vessels cannot navigate it; and as there seemed to be no commercial prize in view, the island was left in its isolation entirely outside the current of the world's affairs.

The natives of northern Australia reported, about 15 years ago, that a black from the island had come to them on a rough raft made by lashing small timbers together. They understood his dialect with difficulty, but got the idea that many persons lived on the island. He soon returned to his home.

According to the Brisbane newspapers, Mr. Roth has returned from a visit to the island, and says that the people, perhaps 500 in number, whom he met there, have apparently had no intercourse with the outside world for many generations. They have forgotten most of the rude arts their fathers may have brought from the Australian mainland, and are inferior in their conditions of life to the continental aborigines, of whom they are evidently an offshoot. Mr. Roth found the coast lands very swampy, and apparently did not penetrate far into the island. The natives fled at his approach, and it was only by patient diplomacy that two of them were finally induced to enter his camp. Others came in gradually, and at length about 200 were grouped around the visitors.

Through natives he had brought with him Mr. Roth was able to have a little conversation with the islanders. He found their way of life very primitive, even as compared with that of other Australasians. They are skilful in the use of their boomerangs and wooden javelins, but are far behind all the other natives of islands in that part of the world in the art of navigation. Their boats are nothing but the rudest log rafts, propelled by poling or paddling. They wear no clothing of any description. They live out in the open without even the most rudimentary shelter, and when protection is at times necessary they content themselves with making heaps of more or less dry vegetation, into which they crawl. They have no idea of the art of plaiting, and therefore lack the baskets in which many savage folk carry food and other articles. They transport their belongings by tying them up in bits of bark.

They live entirely on wild fruits, fish, and game, and have apparently not the slightest conception of agriculture. They are good hunters and fishermen, and know the use of fire in cookery, producing a blaze by the friction of two pieces of wood. These poor people seemed to Mr. Roth to be very simple and child-like, and showed no evidence of treachery or malice, but they were easily frightened. They were somewhat alarmed when the white man lit his pipe, and begged to know why he had set his mouth on fire. Many tin whistles which were distributed among them gave so much entertainment that, when the supply gave out, a few parents offered children in exchange for these musical instruments.

POLAR.

Arctic Cruise of the Duc d'Orléans.—Having chartered the *Belgica*, and secured the services of Captain Gerlache to command the ship, the Duc d'Orléans

and his party left Sandefiord on May 6 for Bergen and Shannon Island, off the east coast of Greenland. The party intend to spend the summer cruising in the Arctic Ocean, between Spitzbergen and Greenland, and to carry on some oceanographic studies. It is not the intention to winter in the Arctic, though the vessel is provisioned for the unexpected contingency of being detained next winter by the ice conditions. The Duke will visit Shannon Island to see if the members of the Ziegler Expedition reached that place, where a depot of provisions had been left for them in case their fortunes should lead them to or near the east Greenland coast. If he should find the members of the party they are to return with him to Europe. The Duke's party includes a number of French scientific men and Norwegian sailors. If all goes well the *Belgica* is expected to return in September.

Some Results of the British Antarctic Expeditión.—Five papers by members of the *Discovery* Expedition, printed in the April number of the *Geographical Journal*, sum up in a preliminary way the leading results of the two years' work, and include facts of value that had not hitherto been made public. The general geography of the Victoria Land region is treated by Captain Scott; the physical geography by Mr. Ferrar; meteorology by Lieut. Royds; seals and birds by Dr. Wilson; and the marine biological collections by Mr. Hodgson. A paper is also contributed by Capt. Colbeck on the Antarctic sea-ice. In this paper he includes a discussion of the observations made by the *Southern Cross* Expedition in 1898–1900, and by the relief party in the *Morning* in 1902–4.

Among the chief problems were the remarkable ice conditions, described by Capt. Scott and Mr. Ferrar, which are certain to attract much attention among physical geographers. Capt. Scott says that though there are innumerable glaciers on the coast of Victoria Land, most of them merely discharge local névé fields lying in the valleys of the coastal ranges. Very few run back to the inland ice, and these may be divided into two classes—the living and the dead. In the long stretch of coast between Cape Adare and Mount Longstaff, over 11° of latitude, there appear to be only four living ice discharges from the inland.

He says that the Ferrar glacier is typical of the dead glaciers. The ice in the valley is practically stationary and gradually wasting away from the summer thawing. This glacier probably contains as much ice as any hitherto known, and the Barne and Shackleton glaciers contain a great deal more. They are now in a greatly diminished state, and it is interesting to think what vast streams of ice they must have been at their maximum.

Capt. Scott submits the conjecture that the inland ice once stood from 400 to 500 feet above its present level. He also says, referring to the Great Barrier, that its edge, sixty years ago, was in advance of its present position, in places as much as 20 or 30 miles.

Many other facts given seem to confirm these generalizations, and, taken with the moraines and erratics seen by Mr. Ferrar and Dr. Wilson high above the present level of the ice-sheet, go to show that "the majority of curious and often vast ice formations met with in the Ross Sea must be regarded, not as the result of present-day conditions, but as the rapidly-wasting remnants of a former age."

These facts are believed to prove beyond doubt that the ice in at least this part of the Antarctic regions is in a state of fairly rapid retreat, and it is known that the same thing is happening in the Arctic regions. It is very significant that Dr. Otto Nordenskjöld, in his recent book, reports a similar retrogression of the ice masses in West Antarctica, as the Graham Land region is now called.

Mr. Ferrar reports that denudation is at present playing a comparatively unim-

portant part in determining the features of the landscape. The Royal Society Range, indeed, shows some rounded rock surfaces, due to the grinding of ice or of the rock matter carried along by ice, but no evidences of similar "ice work" were seen near winter quarters. The splitting of rocks, due to the percolation of water, which expands on freezing, is at present the most important factor in the denudation of the land.

The geological study of the Royal Society Range, a little inland from the winter quarters, showed a gneissic platform, probably of Archæan age, and above it in order are granites of two ages, and sandstone 2,000 feet thick, with basalt capping the sandstone, the whole forming plateaux that have been dissected by denudation, and probably also broken up by faulting. At the base of the basalt is a thin carboniferous seam not more than an eighth of an inch in thickness. It was agreed that this seam must be due to vegetation, but the plant remains could not be identified.

Dr. Wilson records that the Weddell seal is more often met near the land than any other. He thinks there is little prospect of a profitable Antarctic seal fishery, though there is an increased demand for the skins of the hair seals; but these skins rarely escape defacement by the wounds inflicted by the killer whale.

Mr. Hodgson reported on the biological collections that everything goes to show that animal life is very abundant in the southern seas, and the Ross Sea is still an exceedingly rich area for the biologist. The large collections of the *Discovery* are now in the hands of experts for description. The three voyages of Capt. Colbeck have convinced him that ships going south for geographical work during the summer should enter the pack between 178° and 180° E. Long. as early in December as possible, the ice there being lighter and more open than elsewhere.

GENERAL.

Deforestation and Climate.—Whether forests have an important influence upon climate is an old question which has not yet been satisfactorily settled. Dr. Hennig gave an address on the subject before the May meeting in Berlin of the German Meteorological Society, in which he claimed only that dense forests favour moisture and prevent the drying out of soils to a considerable extent, and adduced a number of coincidences where the depletion of the forests appears to be attended by drier conditions. According to Consul-General Günther, of Frankfort, who has summarized the address for the *Consular Reports*, Dr. Hennig said that the climate of Greece, where to-day only 16 per cent. of the area is covered with forests, has become drier. An increase of temperature and decrease of rain are noted, as compared with ancient times. This is especially noteworthy in Attica, which was thickly covered with forests about 3,000 years ago, and where hardly any rain now falls; while the heat in the open air attains a degree of intensity that would make the indulgence in athletic sports, once famous, now almost an impossibility.

Similar conditions exist in the Peninsula of Sinai, where thousands of years ago the people of Israel found a luxuriant and fertile country, though to-day it is a desert. Palmyra, also once a flourishing oasis in the Syrian desert, presents to-day only a waste of stones and ruins. In Mexico, where the Spaniards cut down the forests in the mountains, droughts changing to devastating floods are now noticeable, especially in the neighbourhood of the City of Mexico. In Algeria, where, since the middle of the last century, the forests have been cut down on a large scale, dry weather has increased; and in Venezuela the level of Lake Tacarigua, to which Alexander von Humboldt drew attention, has been lowered in consequence, it is said, of deforestation.

The Centenary of Don Quixote.—Under this heading the *Boletín* of the Royal Geographical Society of Madrid presents the second (enlarged) edition of a work first printed in 1840, under the title of *The Geographical Skill of Miguel de Cervantes*, by Don Fermin Caballero, supplemented by two later writings of his—one, *The Country of Don Quixote*, the other, the *Map of the Field of Montiel.*

A short paper on the *Geographical Knowledge of Cervantes*, by Don Cesáreo Fernández Duro, serves as an introduction to the others.

All these may be read with pleasure, if not with conviction. Men will continue to find what they look for in Cervantes and Shakespeare, and too often without the saving grace of humour to keep them within bounds. A plate designed by Señor Caballero, with the inscription, *Miguel de Cervantes Saavedra occupying his place among geographers*, shows the globe in the centre, with the name Cervantes across it and the names of forty-eight geographers distributed in the spaces between lines radiating from the globe.

The fitting comment on such extravagance is the famous line,

Voto á Dios que me espanta esta grandeza.

OBITUARY.

Professor Élisée Reclus.—Scientific men all over the world will learn with the deepest regret of the death of Élisée Reclus, who will always be remembered as one of the great geographers of the nineteenth century. His death occurred at Brussels on July 7. He had been Professor of Geography at the University of Brussels since 1894. He was born at Saint-Foy-la Grande, Gironde, in 1830, and laid the foundation of his geographical education under the guidance of Karl Ritter, with whom he studied for several years at the University of Berlin. Soon after the close of his school studies he travelled widely in Europe and America, practically applying the principles he had acquired by six years of geographical field study, which, in the Western world, was extended over the United States, Central America, and parts of South America. He wrote a number of articles in French reviews on the results of his studies abroad.

His socialistic ideas were held in France to be dangerous, and when, in 1871, he published a very severe arraignment of the French Government and cast his lot with the insurgent National Guard, he was kept a prisoner for some time, and finally sentenced to be transported for life to New Caledonia. The scientific men of many countries protested against the imposition of this terrible penalty, which would end the usefulness of a great geographer and be a distinct loss to science. As a result of this protest the sentence was modified to banishment, and most of the remainder of Reclus's life was spent in Switzerland and Belgium. He was, however, permitted to return to France when amnesty was extended to all the Communists in 1879, but later he was condemned at Lyons as an associate of Prince Kropotkin, the distinguished Russian geographer, in the organization of an anarchist movement, and he escaped arrest only by again taking refuge in Switzerland.

While in Switzerland he began the composition of his monumental work, the "Nouvelle Géographie Universelle," which was translated into English under the title of "The Earth and its Inhabitants." The work, published in parts as he wrote it, contained about 3,500 maps and many other illustrations. It was a treatise in nineteen large volumes on the geography of the earth and the social and economic development of its inhabitants. This work, the result of the enormous labour, the rare knowledge, and geographical gifts of its author, though not wholly free from error, and not accepted in all its statements and theories, has been justly regarded as

one of the greatest of geographical productions. Its preparation occupied twenty years of the author's life. Reclus revisited the United States in 1891 to collect material for his volume on this country. The last to be written were the two volumes on South America, and at the conclusion of the work Reclus wrote "A Parting Word" to his readers, in which he said:

> I may congratulate myself on the good fortune by which, in the course of a life not lacking in stirring incidents, I have been enabled to fulfill my engagements of regular publication without ever once breaking faith with my readers.

Reclus was endowed with rare scientific qualities, and possessed a literary gift that interested most readers in all that he wrote. This happy combination made him one of the most widely read of geographers.

THE BIBLIOTECA NAZIONALE CENTRALE of Florence announces, under date of June 8, the death of Comm. DESIDERIO CHILOVI, its chief Librarian for the past twenty years.

THE ROYAL BOHEMIAN SCIENTIFIC SOCIETY, of Prague, reports the death, on the 12th of June, in his 88th year, of W. W. RITTER VON TOMEK, the oldest member of the Society, and for many years President of the Imp.-Royal Government Council.

WILLIAM ZIEGLER.—Mr. Ziegler died at his summer home in Connecticut on May 24. He had been in excellent health until the previous November, when he was thrown from his carriage and severely injured. Born in Beaver County, Pennsylvania, in 1843, he made his own way, soon developed remarkable talents for business, and, before reaching middle age, accumulated a large fortune. He became known to geographers about five years ago through his zealous promotion of north polar explorations under his own management and solely supported by him. His desire was that the North Pole should be reached by one of his expeditions, and he was willing to spend money without stint to achieve his ambition.

He chose the Franz Josef Land route for his attack on the Pole, in spite of the fact that it had not recently been viewed with much favour. His first expedition, commanded by Mr. Baldwin, reached Franz Josef Land in 1901, but failed to make any important northing, and returned in the summer of 1902. In 1903 the second expedition under Mr. Fiala started north, and succeeded in getting into the heavy ice of Barents Sea, where it is possible their ship may have drifted to Franz Josef Land; but nothing has been heard from the party, as the relief expedition of 1904 was prevented by the ice from getting north. At the time of his death Mr. Ziegler had just completed arrangements for this year's relief expedition, which started from Norway late in June on the *Terra Nova*, in charge of Mr. W. S. Champ. It is said that Mr. Ziegler instructed the executors of his estate to continue the work of his polar expeditions.

NEW MAPS.

AFRICA.

AFRICA.—Map of Africa. Scale: 1,000,000, or 15.7 statute miles to an inch. Sheet 71 (Monrovia). Intelligence Division of the War Office, London, 1905.

Includes most of Liberia, and a part of the Ivory Coast. A note says that, excepting the Anglo-Liberian frontier, no part of the area has been surveyed, and the positions of villages, rivers, and hills are only approximate. About two-thirds of

the sheet is practically white; still, the naming of the civilized settlements of Liberia in their approximate position is an advantage which, perhaps, this sheet is unique in offering. Cape *Montserrado* is printed instead of the accepted form *Mesurado*, which is certainly found in most, if not all, of the best atlases. The original Portuguese was Monte Serrado.

RHODESIA.—River Zambesi from Zumbo to the Victoria Falls. In 3 Sheets. Scale, 1:250,000, or 3.94 statute miles to an inch. British South Africa Company, London, 1905(?).

The latest information concerning the navigability of the various reaches of the Zambezi comes from Major Gibbons, and the facts reported by him in his recent book are recorded on this map. It was compiled chiefly for the administrative staff stationed in districts near the Zambezi, so that on this large scale they may conveniently place upon it further particulars of the navigability of the river and its tributaries in regions adjacent. This information will ultimately be incorporated with the six-sheet official map of Rhodesia.

RHODESIA.—A map of Rhodesia divided into Provinces and Districts under the Administration of the British South Africa Company. 6 Sheets. Scale, 1:1,000,000, or 15.7 statute miles to an inch. British South Africa Company, London, 1903. Price, £1, 4s.

This is a revision of the official map of the Company's sphere of operations, embracing approximately 750,000 square miles. The revision was very carefully done; and new information accumulates so rapidly in that developing region that the two northern sheets were practically redrawn. Gold fields, reefs and mines, altitudes, roads, railroads, and a large nomenclature are among the features. The large scale permits the introduction of much explanatory matter relating to geology, topography, the fly districts, forest and grass areas, etc. No attempt is made to delineate the surface forms, but this could not be done accurately on so large a scale. For most purposes this is the best map yet produced of this large territory.

TOGO.—Die Umgebung der Station Atakpame. Scale, 1:100,000, or 1.57 statute mile to an inch. By P. Sprigade. Drawn by G. Thomas. *Mitt. von Forsch. und Gelehr. aus den Deutsch. Schutzgeb.*, Vol. 18, No. 2. Berlin, 1905.

Atakpame, a German station in the interior of Togo, lies among hills from 1,000 to 2,000 feet high, forming the water-parting between the Amutshu and Atalo Rivers. These hills overlook a very fertile and populous farming region, and this sheet distinguishes it as one of the best-mapped districts in tropical Africa.

It is based upon the ascertained position of Loboto, one of the points in Plehn's triangulation of central Togo, and upon much other work with theodolite, compass, and chain, the result being an accumulation of accurate topographical data which could not adequately be expressed on a scale of 1:200,000, which is the scale of the map of Togo, now far advanced. Double this scale was, therefore, adopted for this sheet, which contains a most unusual amount of information for an African map. We see the wide-built roads, the bridges, the causeways over the swamps, native paths, Government and mission stations, camping grounds, and other cultural features in their relation to the topography of the entire region. There are a large number of place-names, with the number of huts in each settlement, the width of the streams at various parts of their courses, and the position of the native markets, often at a considerable distance from villages, or even houses. A special map of Togo on a scale of 1:100,000 (about forty sheets) will probably not be long delayed, as the cartographic material that the German officials have collected cannot be satisfactorily used on a much smaller scale.

AMERICA.

NEW JERSEY.—Geological Survey of New Jersey. Scale, 1:63,360, or one statute mile to an inch. Revised Edition of the original Survey of 1882 and 1883. Sheets 22, 23, 24, 26, 27, 28, 31, and 32. Contour interval, 10 to 50 feet. Henry B. Kümmel, State Geologist; C. C. Vermeule, Topographer. Trenton.

These eight sheets are the first to be issued of the revision of the Topographic Atlas of New Jersey. At the beginning of 1903 some of the sheets of the Atlas were out of print, so that new editions were necessary. This fact gave opportunity for extensive revision of the sheets, which were especially in need of correction in the neighbourhood of the more important cities. The necessary field revision and the preparation of the new maps have occupied much of the attention of the topographic force since early in 1903.

Eight of the seventeen sheets in the series have now been issued, and the complete set will be numbered from 21 to 37 inclusive. They will take the place of the old sheets 1 to 17.

In large part, these revised sheets cover the same territory as those which they supplant, but one important change has been made. The old sheets overlapped, but many purchasers thought that sheets which did not overlap, but were matched edge to edge and arranged in tiers across the State, would be preferable. The new sheets are in accord with this suggestion.

NEW JERSEY.—Topographic Map of New Jersey. Scale, 2,000 feet to an inch (Dover-Stanhope, Boonton, and Chester Sheets). Contour Interval in level country, 10 feet; in hilly country, 20 feet. Geological Survey of New Jersey, Trenton, 1905.

The area represented by these three sheets was resurveyed in 1904. The original topographic survey of the State was completed in 1887 and the resurvey was begun in 1898. The new map of which these sheets are a part was needed, because the rapid extension of city streets, railroads, new townships, political boundaries, mining information, etc., could not all be well laid down on the scale of the old survey. The scale of the new maps is about two and a half times that of the maps of the old series. The work is progressing slowly, but the larger scale permits many additional details and corrections and a more accurate delineation of a large variety of facts than could be shown on the one-inch scale. It will be used for many purposes in preference to the one-inch map, but cannot supplant the revised edition of the latter, now in progress, for general atlas use.

UNITED STATES.—Geologic Atlas of the United States. No. 121. Waynesburg, Folio, Pennsylvania. Washington, 1905.

The quadrangle is well within the great Pittsburgh coal field on one of the Allegheny plateaux. The stream valleys are narrow, the slopes steep, and the hill tops have no extensive levels, so that there are only small areas desirable for cultivation, most of the land being used for pasturage.

No. 123. Elders Ridge, Folio, Pennsylvania. Washington, 1905.

This quadrangle is in central-western Pennsylvania, a rural area on one of the Allegheny plateaux where the streams are deepening their channels so rapidly as to prevent the development of broad flood-plains, with the result that good soil afforded by alluvial deposits is not extensive. There are about 30 hamlets in the quadrangle, and Avonmore, the largest village, has a population of about 700.

CUBA.—Carte de Cuba. (No Scale.) *Bull. de la Soc. de Géog. de Lille.* May, 1905.

The facts shown on this map are emphasized by the exclusion of everything else. These facts are: all the chief ports; the east and west trunk line railroad; the railroads

connecting north with south coast ports; the three regions in which tobacco, sugar, and cattle-raising respectively predominate; and the eastern region of forests, mining, and some fruit. Thus the most vital facts relating to inland transportation and the distribution of the leading industries may be readily seen.

MEXICO.—Mexican Railways and Lines of Navigation in 1904. Scale, 150 miles to an inch. In "Commercial Mexico in 1905." Bureau of Statistics. Washington, 1905.

Shows the extension of the Mexican railroad system to the frontier of Guatemala. The names of steamship lines plying on the various sea routes are given.

EUROPE.

AUSTRIA-HUNGARY.—Brionische Inseln. Scale, 1:36,000, or 0.57 statute mile to an inch. *Deutsche Rundschau für Geog. und Stat.* Jahr. 27, Heft 8. A. Hartleben's Verlag. Vienna, 1905.

Showing the results of the topographic survey of seven small islands in the Adriatic near the town of Pola. It is an excellent reproduction from the Government map and illustrates an article on the islands. It may interest some American map-makers to observe that the islands, as shown on this plate, are about 40 times larger than the delineation of them on atlas sheets of Europe, the scale for European countries usually being 1:1,500,000; and yet in the Stieler and some other atlases the two larger islands are shown on the small scale with perfect accuracy in general outline. Of course the minor windings of the coast-lines cannot be drawn on such a scale, and the smaller islands can appear only as dots.

CENTRAL EUROPE.—Phaenologische Karte des Frühlingseinzugs in Mitteleuropa. Scale, 1:3,400,000, or 53.6 statute miles to an inch. *Pet. Mitt.* Vol. 51, No. 5. Justus Perthes, Gotha, 1905.

The map and the accompanying paper were prepared by Prof. Dr. E. Ihne of Darmstadt. In many places throughout Germany and, to a lesser extent, in parts of Austria and Switzerland north of the Alps, the time of the blossoming of a considerable number of plants, including some of the fruit trees, has been observed for years. Dr. Ihne has collected and collated a great mass of authentic information on this subject and gives graphic expression on his map to the distribution of the various periods of bloom in Central Europe. He recognizes five periods, the earliest, coloured yellow, being from April 22 to April 28 in the more sheltered or southerly places, as the Rhine valley south of Cologne, or parts of Austria east of the Alps and south of the Danube; red shows the lands where bloom is still early (April 29–May 5), chiefly in river valleys and in wide parts of France and Belgium where climate is softened by the neighbouring ocean; green shows the medium period of bloom (May 6–12) covering nearly all the low plain of the north, except a wide strip along the Baltic coast of Prussia, and also including some of the plateaux among the mountains of south Germany; violet is spread over the regions where the blossoms come out late (May 13–19), as in the zone along the Baltic and the higher lands that join the mountains of the south with the great plain of the north; and blue covers the narrow areas of very late bloom on the hills and ranges that dominate South Germany.

GERMANY.—Küstenänderungen in Süderdithmarschen im 19 Jahrhundert. By L. Müllenhoff. *Pet. Mitt.* Vol. 51, No. 4. Justus Perthes, Gotha, 1905.

Four maps and a profile illustrating a paper by Prof. Dr. R. Hansen on the changes along the west coast of the Dithmarschen in the neighbourhood of the Elbe estuary. The maps are: Ehemaliger Elbeufer, scale, 7.8 statute miles to an inch, showing the former course of the Elbe extending through the Dithmarschen; Trischen, scale, 1,250 feet to an inch, outlining the coasts of the island in 1874, 1884, and

1894, the land area having been much extended in twenty years; Die fiskalische Süderdithmarscher Küste in 1797, 1854, 1894, and 1904, on a scale of 1.8 statute mile to an inch, indicating great changes in the outline of the coast and outlining the dykes built to protect a part of it; Helmsand, another of the Dithmarschen islands, showing that in a century and a half its area has been greatly reduced. A cross section through the dune on Trischen shows its considerable increase in width and in some places in height in 1895 as compared with 1894.

ICELAND.—Öræfajökull og Skeidarársandur. Scale, 1:200,000, or 3.1 statute miles to an inch. Surveyed by the General Staff, Topographic Division. *Geog. Tidskrift* of the Royal Danish Geog. Soc. Vol. 18, Nos. 1–2. Copenhagen, 1905.

An excellent specimen of the survey work that the Danish Government is now carrying forward in Iceland. It shows the courses of the glacial streams and indicates the topography by contours with an interval of 40 metres.

GENERAL.

EDUCATIONAL MAPS.—The Autograph Hand-Maps. The Oxford Geographical Institute, Oxford, England. Price, 1d.

Outline maps to be filled out in the class-room do not usually show topographic delineations, but the special feature of these maps is the insertion of hill-shading in brown. This should add to their educational value so far as topographic forms influence the distribution of commercial routes, precipitation, and other facts that the student is required to draw on such maps. Thirty-three maps have now appeared in this series, including most of the European countries and the United States. The natural English and metrical scales are given. Some of the world maps are on the equal area projection, or, in other words, a square inch on any part of the map represents the same number of square miles.

MAP SUPPLEMENTS.—Kartenbeilagen. Bearbeitet von Prof. Paul Langhans. A series of 16 map plates in "the Geographen-Kalender," 1905-1906. Justus Perthes, Gotha, 1905.

This year's issue of the Geographen-Kalender contains the usual instalment of supplementary coloured maps illustrating conspicuous events of the past year. They include: The northern part of the Hejaz railroad (which, when completed, will connect Damascus with Mecca), showing the section in operation east of the Jordan, about 250 kilometers, and the parts now building, or in course of survey; the route of the British to Lhasa with the new Indian-Tibetan markets of Gyangtse and Tadum; the completed railroad on the Trans-Siberian Railroad, around the south end of Lake Baikal; the growth of the Japanese Empire since 1875, showing lands appropriated or acquired in war, and also the southern part of Sakhalin, lost by Japan in 1875; the French and British spheres of influence in Siam, with the boundaries between that kingdom and the French and English colonies; the boundary changes in West Africa and the Western Sudan, according to the British-French and French-Portuguese agreements; the region of the German Southwest Africa war, indicating farms destroyed; the development of the United States, 1855-1905 (the compiler of this plate was deceived by legislation pending in our Congress: New Mexico, Arizona, Oklahoma and the Indian Territory are still Territories); the cable line to Alaska and its land telegraphs (the connection between St. Michael and Nome is not submarine cable, as indicated, but wireless telegraph); the new boundary between Bolivia and Brazil; the routes of the Merzbacher and Saposchnikov expeditions among the Tian-Shan and Alai-tagh ranges; the Dutch explorations in Borneo and New Guinea; the search of the *Tacoma* for doubtful islands in the Pacific; the

position of Dalgety, capital of the Australian Commonwealth ; the travels of McMillan and Liddell in the basin of the White Nile ; French explorations in the Sahara ; and the new boundary between Brazil and British Guiana.

BOOK NOTICES.

The Andrew J. Stone Explorations in Arctic and Sub-Arctic America. 38 pp., 52 half-tone Illustrations and 3 black-and-white Maps in Text. 4to. Edition limited to 100 numbered copies, all of which have been distributed. The American Museum of Natural History, New York, 1905.

This handsome brochure commemorates the very valuable results of the collecting and exploratory expeditions of Mr. Stone in the Arctic regions of North America between 1897 and 1904. The generosity of a few persons made it possible for Mr. Stone to attack the zoological problems of northern Alaska and the Canadian northwest, and the outcome should encourage such donations for scientific purposes. His expeditions were rich in contributions to our knowledge of the distribution of the game animals of the high north, and in the correction of the maps of the Arctic coast between the mouth of the Mackenzie and Cape Lyon. Some charted lakes and rivers were found to have no existence, and others that had been overlooked were charted and named by Mr. Stone. He also took many photographs and anthropometric measurements of Indian and Eskimo tribes. Somewhat extended descriptions of his work are given in the *Bulletin* of the Amer. Mus. Nat. Hist., Vol. 13, pp. 31–62, and Vol. 14, pp. 53–68. The brochure contains many beautiful pictures of big game animals collected by Mr. Stone and now mounted at the Museum. His collections during three seasons, 1901–1903, numbered 2,325 mammals and 617 birds, besides many nests and eggs.

Le Mexique au Début du XXe Siècle. Par le Prince Roland Bonaparte, Léon Bourgeois, Jules Claretie, d'Estournelles de Constant, A. de Foville, Hippolyte Gomot, O. Gréard, Albin Haller, Camille Krantz, Michel Lagrave, Louis de Launay, P. Leroy-Beaulieu, E. Levasseur, le Général Niox, Alfred Picard, Elisée Reclus. 2 vols., 394 and 374 pp., many black-and-white maps in the text and 4 coloured maps. Librairie Ch. Delagrave, Paris, 1904. (Price, fr. 30.)

At the close of the Paris Exposition in 1900, M. de Mier, the Mexican Minister to France, conceived the idea of enlisting the collaboration of eminent specialists to write a description of Mexico in her various aspects. He placed before them all the best sources of information, and in less than five years his idea was realized in these two sumptuous volumes. Sixteen men, widely known in their special fields of study, are the authors, and the whole work has been under the editorial supervision of E. Levasseur, who has recently been chosen President of the Collège de France.

It is a beautiful and costly work, superior in mechanical execution and in maps, and each of its seventeen long sections bears the stamp of expert preparation. Some risk, however, is involved in this method of producing a book, and these volumes have not wholly escaped. Some of the topics overlap, and there are several instances of inconsistency in the facts given by different authors. Some statements, also, are likely to be disputed ; and, in fact, two or three not very vital remarks by Prince Roland Bonaparte, relating to the Indian population, have already been called in

question. The few typographical blunders are, of course, very conspicuous in pages so handsomely printed; and the general atmosphere of the work is, perhaps, a trifle too optimistic, though even a sober-minded German savant could scarcely escape a little enthusiasm over the wonderful progress of Mexico in the past quarter of a century. The lack of an index, as in so many French books, is regrettable.

Among the sections of special interest to the geographer are E. Reclus's description of the physical geography (45 pp.); Prince R. Bonaparte's section on the population and colonization of the country, including the emigration movements that led thousands of Mexicans far afield to the Philippines, Florida, Cuba, and California (69 pp.); Gomot on Agriculture (67 pp.); de Launay on the metals and the mining industry (61 pp.); Picard on industry, trade, and navigation (71 pp.); Krantz on railroads and public works (58 pp.); and Lagrave on the post and telegraph services (25 pp.). The political institutions, public finances, monetary and banking systems, education, position of Mexico in science, art, and literature, the army and navy and exterior relations are treated by equally authoritative writers.

There are numerous excellent small maps of the ports, and the larger coloured maps illustrate the distribution of agricultural products and minerals, the physical and political features, and the railroad system. The especially interesting railroad now rebuilt across the Isthmus of Tehuantepec is shown on a sufficiently large scale. Prof. Levasseur, the editor, acutely and eloquently sums up the whole work (45 pp.), and also contributes a short historical review of the country.

Diccionario Sipibo. Castellano-Deutsch-Sipibo. Apuntes de Gramatica. Sipibo-Castellano. Abdruck der Handschrift eines Franciskaners mit Beiträgen zur Kenntniss der Pano-Stämme am Ucayali herausgegeben von Karl von den Steinen. Berlin, 1904. Dietrich Reimer (Ernst Vohsen).

The well-known ethnologist Professor Dr. Karl von den Steinen, one of the directors of the Royal Museum of Ethnology in Berlin, has published under the above title a MS. ascribed to an unknown Franciscan monk, giving a vocabulary of Spanish and Sipibo (Pano), probably, according to the editor, of about the year 1877; another vocabulary, Sipibo and Spanish, from 1810 to 1812; and, lastly, an addition to the second. The former also contains, at the end, a number of grammatical notes. The learned editor introduces these publications (of hitherto as good as unknown manuscript) by a bibliography, and a short discussion of pictographs on cotton-cloth, reported (from hearsay) to have been met with among the Pano in the second half of the eighteenth century. Thereupon follows an historical sketch of the Panos from the seventeenth century on, a list of the Pano tribes in Peru, Bolivia, and Brazil, and notes on the vocabularies. The part relative to supposed picture-writings of the Panos (about which Humboldt wrote in very cautious terms) may be dismissed with the remark that, since they were on pieces of cotton-cloth tied with agave fibre, it is not impossible they may have belonged to the class already made by Indians in the latter half of the sixteenth century, and still used by them to-day in Bolivia—for memorizing parts of the catechism, for instance. That the pieces of cloth contained human and animal figures, together with "isolated characters, that were taken for hieroglyphics," at Lima, and painted "in lines with wonderful order and symmetry," also recalls (the "wonderful" part excepted) these Indian substitutes for writing. There are, in the Beni region to-day, aged Indians who remember Latin prayers taught their forefathers in the now long-abandoned missions.

For Dr. von den Steinen, the history of the Panos begins in the middle of the

seventeenth century. The numerous expeditions down the Napo and the Amazon since 1538 have left us (so far as documents show) no local or tribal name that might lead to the inference that any branch of the Panos had been touched by these expeditions, and yet it is almost impossible that Orellana, in 1542, should not have come in contact with one or the other branch of them. The same may be at least supposed of the expedition of Pedro de Ursúa (in 1560), and it would not have been superfluous to mention such possibilities, as well as the expeditions made by Juan de Salinas Loyola between 1570 and 1577. In addition to these, George Hormuth of Speyer, and especially Philip von Hutten, penetrated, as Governors or administrators of the German colonial and commercial plant in Venezuela—the first as far as the Uaupés, the latter to the Omaguas. While there is hardly any positive evidence, as yet, that these expeditions came in contact with the Pano tribes, they grazed the ranges thereof so closely that it might have been well to mention them.

It is to be regretted, also, that the Professor has not given in his chapter or section dedicated to the list of Pano tribes in Peru, Bolivia, and Brazil a clearer *aperçu* of the present distribution of the Panos. This may be in part deduced from the notices taken by him from various sources, but it would have been better to state, in a few introductory lines, the actual range of the linguistic stock in general. This could easily be done by means of the Raimondi Atlas of Peru (which, by the way, Dr. von den Steinen absolutely ignores in the cartographic part of his bibliography). Plates 3, 4, 8, 9, 13, and 17 of that atlas indicate the approximate location (close circumscription is never possible with unsettled Indians) of at least eight of the groups into which the German ethnologist subdivides the Panos.

The linguistic part of the work, the vocabularies proper, is of course very valuable. The first one (Sipibo and Spanish) contains as many as 2,513 words, the second (Spanish and Sipibo) 2,656, most of which, however, are included in the former also. It is a duty to thank Professor von den Steinen for having placed within the reach of linguistic students such an amount of material.

The editor does not seem to have known, when he published all this material, of the existence of another vocabulary, printed at La Paz (Bolivia) in 1898, and due to the efforts of the present Bishop of that city, Don Fray Nicolas Armentia, for many years missionary in the regions of the Beni River. This vocabulary, which includes about 3,800 words (nearly 1,300 more than the first one of Professor von den Steinen, 1,100 more than the second, and 600 more than the two combined), was published in No. 1 of the first volume of the *Boletín de la Sociedad geográfica de La Paz*, and as no reference to it is made in the bibliography, it may not be improper to allude to it here. Its title is (p. 43): "*Vocabulario del Idioma Schipibo, del Ucayali, que es el mismo que el Pacaguara del Beni y Madre de Dios. Este es un dialecto de la lengua Pana, que es la lengua general del Huallaga, del Ucayali y de sus afluentes.*" A brief reference to von Tschudi, *Peru* (1846, Vol. II, p. 221 to 241), in the Bibliography, might not have been amiss.

A. F. B.

The Tower of Pelée. New Studies of the Great Volcano of Martinique. By Prof. Angelo Heilprin. 62 pp., 23 photographic plates, and Index. J. B. Lippincott Company, Philadelphia, 1904.

The volume being a quarto gives ample page space for the large and beautiful photographs, taken by Prof. Heilprin, illustrating chiefly the later phenomena associated with the eruptions of Pelé. The letterpress is especially devoted to a discussion of the history and nature of the great tower which for so many months was the centre of interest in the crater of Pelé, but which was doomed to destruction. Its

disappearance seems to have marked the beginning of a new period of activity in the volcano.

It is well known that Prof. Heilprin differs from some other students of the volcano in his views as to the origin of the tower, which, he believes, "was merely the ancient core of the volcano that had been forced from the position of rest in which solidification had left it." The French observers, on the other hand, believe that the tower was an extrusion of solidified new lava—a view to which Prof. Heilprin at first inclined, and this volume gives his reasons for revising his opinion. He makes the point clear that there are still many unsettled questions relating to the mechanism of the eruptions and the accompanying phenomena.

An den Grenzen von China und Tibet. Von H. Hackmann. Halle a S., 1904. Gebauer-Schwetschke, Druckerei und Verlag (m. b. H.).

This pretty little book does not claim to be anything more than the diary of a simple traveller who wishes to share the impressions and experiences of an interesting trip with his fellow-men. But the author, although not a geographer or other scientist, but a missionary returning home from the field of his labours through a country little visited by travellers in order to study some special forms of Buddhism, has made a real contribution to our knowledge of southwestern China. While the regular road from China to Burma goes from Suchou on the Yang-tse south-west toward Yunnan-fu, he traversed a practically unknown region west of that route in the border mountains of China, Tibet, and Burma. In that interesting country the contact of several races on a territory almost secluded from the outside world has produced very peculiar ethnological conditions, and no less complicated geologic problems result from the contact of the Indo-Chinese and Central Asiatic mountain ranges and await the visit of the explorer who shall be able to devote his whole time to their study. For one to whom the geographical part of the trip was only a side issue, the author deserves the gratitude of the geographers for collecting so much that is valuable for their work.

It is especially pleasant to see that the author does not, like many amateur geographers, commit the mistake of considering his own personal experiences and supposed acts of heroism the nucleus of the narrative; it is for the sake of the subject that he speaks to us, and only because he knows that there is at present nobody in possession of newer and better information than he. With the same modesty he excludes from his narrative all remarks on parts of the country visited recently by regular explorers, so that it is most likely to be read with the same interest by the geographer hunting for new information as by the layman who enjoys the charm of a well-written story of travel and adventure.

The route pursued followed the valleys of the Min-kiang and the Ya-ho Rivers, tributaries of the Yang-tse, up to the city of Ya-chou, with a side trip to the holy mountain of Omi, description of which must be reckoned among the gems of geographic literature; from there to the west across the Elephant-Pass to Ta-tshien on the Tung-ho, another tributary of the Yang-tse; down that river south to Tzta-ti and through the Lolo country down the Kien-chang River, then south-west through the country of the Mosso to Tali across the mountains of farthest China, and from there west-southwest *via* Yung-shang and Teng-yüe to Bhamo, where the party struck the regular road again.

The most valuable chapters of the narrative seem to be the reports on those interesting tribes of the Lolo and Mosso, about whom so little is known and with whom, after the natural suspicion against the white man was overcome by means of medical assistance and some presents, the author succeeded in establishing such

friendly relations that the records of his stay among them give a most vivid picture of the character, habits, and primitive civilization of these interesting tribes. The linguistic and religious training of the author makes the ethnological chapters the most scientific parts of the book, while in the descriptions of the landscape the lover of nature and the advocate of the Gospel often betray themselves more than is generally compatible with the character of a scientific report. But then he does not intend to write such a book, and for being less scientific those chapters are no less enjoyable reading. The impromptu experiences and accidents of the trip are recorded with enough good humour to add spice to the narrative, and the perfectly artistic drawings will delight the heart of every lover of the beautiful. The geographer, however, must complain that not a single name is given with any of the illustrations, large or small—an omission the more deplorable because we are told that even the purely decorative designs are authentic copies of originals from the author's collections. In another direction the needs of the scientific reader have been very well considered by the addition of two fairly good maps. As a whole, the book seems well adapted to serve the purpose for which it was written—viz., to create a desire for more information about those interesting out-of-the-way regions and their inhabitants.

M. K. G.

Japan und die Japaner. Von Carl Munzinger. 173 pp. D. Gundert, Stuttgart, 1904. (Price, M. 1.50.)

A book of much literary merit, which claims attention for the ability with which it is written and for the philosophic method which it applies to Japanese problems. The writer, for example, does not merely state the fact that Japanese children are as mannerly and, perhaps, better behaved than those of the Occident, though they are almost never punished; he seeks to show that they are under influences from their earliest infancy tending to make them obedient and respectful, without recourse to the barbarity of corporal punishment. So, throughout his book, he seeks the inner meaning of the phenomena he describes; the geographical conditions and the historical events that have been most impressed upon them; the modern state evolved from Old Japan; the character and soul of the people, and what their religions, their schools, and culture mean to them. It is a book well worthy of an English rendering.

Die Japaner und ihre wirtschaftliche Entwickelung. Von Karl Rathgen. vii und 149 Ss. B. G. Teubner, Leipzig, 1905. (Price, M. 1.25.)

This is one of the series "Aus Natur und Geisteswelt," a collection of small volumes, devoted to the exposition in simple language of many features of human development. Professor Rathgen had the advantage, in writing of the Japanese and their economic development, of having lived for years in their country, and this is his third book relating to the island empire. The volume is a simple and admirable summary of the history, character, and economic conditions of the Japanese, treating of the land and the people, their Government, money and banking, the national finances, and Japan's place in the world's trade. The book concludes with tables of Governmental and trade statistics for a series of years. The bibliography at the head of each chapter is a desirable feature.

Nutzbare Tiere Ostasiens. Pelz und Jagdtiere, Haustiere, Seetiere. Von Emil Brass. viii und 130 Ss. J. Neumann, Neudamm, 1904. (Price, M. 5.)

Mr. Brass was for twelve years engaged in the skin export trade of Eastern Asia. During this time he travelled extensively to enlarge his knowledge of the skin and

fur animals, and collected a great deal of first-hand material for his book. The volume is a compact and well-arranged account of a large number of the wild and domestic animals of the Chinese Empire, Korea, Japan, and eastern Siberia, and of the whaleries and fisheries of the North Pacific. It is a good study in natural history and in the economic aspects of the animal kingdom of Eastern Asia.

A few of these animals are more or less dangerous to mankind, and among them the Amoy tiger, resembling in size and habits the Bengal tiger, appears to be most important. In the neighbourhood of Swatau and Amoy, especially, this tiger kills and carries off many Chinese every year. Missionaries who frequent the cool summer resort Kuliang, not far from Fuchau, tell of a tiger which invaded the town and carried off a woman. Missionaries in a place about thirty miles from Fuchau organized a tiger hunt a few years ago, and sport-loving Europeans from as far away as Shanghai participated. The hunt was arranged for the purpose of ridding the district of at least a part of the animals that had been killing from 200 to 300 human beings in a year. In the peninsula of Kowloon, opposite Hong Kong, these animals are feared because they prey on men.

As a rule, however, the tigers prefer wild and domestic animals, and give men a wide berth. Mr. Brass says that most of the so-called "man-eaters" are old and enfeebled and no longer able to hunt wild beasts. Driven by hunger, they attack man, and soon acquire the habit of preying upon him exclusively until their career is stopped by a bullet or a trap.

Vorläufiger Bericht über eine Archäologische Expedition nach Kleinasien. Von J. Jüthner, F. Knoll, K. Patsch, H. Swoboda. 52 pp. and 2 maps. (*Mitt.* No. 15 der Ges. z. Förder. Deutscher Wissenschaft, Kunst u. Literatur in Böhmen.)

The German-Bohemian Society that sent this expedition to Asia Minor was fortunate in its selection of leader and members of the party. The field was to the west and southwest of Konia in south-central Anatolia, an almost virgin field, as only one explorer, the American, Sterrett, had visited it within the past fifty years. Mr. Patsch, who writes the present report, says that a large part of this region (Isauria) is a desert and poverty-stricken land, though it contains many well-preserved evidences that in ancient times it was the home of a flourishing and cultured people. The sites of a large number of ancient towns were established and over 300 new inscriptions were copied. Among the numerous phases of the work was the complete survey of the magnificently-preserved ruins of Zengibar-Kalesi, near the present Isaura. A number of photographs show the excellent quality of many of the old buildings, with which the present constructions in the same region contrast very unfavourably. The preliminary report will increase the desire to read the full account of this important work.

L'Indo-Chine française. (Souvenirs.) Par Paul Doumer. xvi and 392 pp., 12 Plates, about 150 other Illustrations, 9 Maps in Text, and 1 coloured map. Vuibert et Nony, Paris, 1905. (Price, fr. 10.)

Mr. Paul Doumer was Governor-General of French Indo-China from 1897 to 1902. During these five years he found opportunity to travel extensively in each of the five provinces. Some of these long journeys were made without escort, and almost alone, and in this way he traversed on horseback some of the least-known parts of the colony. His book, which is handsomely printed and illustrated, is not so much a record of these travels as of the impressions and the information he derived from them.

He takes each province in turn, and emphasizes the characteristics that distinguish the region and its people. Such a book cannot be exhaustive, but it may be very instructive when written by a man who, like Mr. Doumer, is an acute observer and has had unusual opportunities for seeing and studying.

Some towns of the East rival one another in trade just as they do in the Occident:

> The mother-of-pearl inlayers live almost entirely in Hanoi and Nam-Dinh, the capitals of Tonkin. There is a difference in their products, the inlaid work of Hanoi being done with much smaller pieces of shell, producing, many think, a finer effect and requiring more labour. But not a few discerning persons prefer the work of Nam-Dinh, though Hanoi has its numerous champions. There is similar rivalry between the embroideries of Hanoi and those of Bach-Ninh. Though the industry is mainly centred in the capital, Bach-Ninh has the advantage of being the home of a celebrated artist in this line, who draws to his large establishment much business from other towns.

On his journey to the colony the author wrote a description of the French-African port of Jibuti (pp. 13–14), which is welcome.

Die Baumwolle nach Geschichte, Anbau, Verarbeitung und Handel, sowie nach ihrer Stellung im Volksleben und in der Staatswirtschaft. Im Auftrage und mit Unterstützung der Bremer Baumwollbörse bearbeitet von Prof. Dr. A. Oppel in Bremen. Mit 236 Karten und Abbildungen. Leipzig, Verlag von Duncker & Humblot, 1902.

This extensive and scholarly monograph on the cotton plant, published by the author for the Bremen Cotton Exchange and with the aid of that body, appears as one of the most valuable books of information about this important plant and its industries. It is divided into two parts—a general and a more specially geographic one. The former presents in a systematic way the history, cultivation, manufacture, and trade relations of cotton and its ethnographic and economic importance; the latter contains the regional treatment of the countries which produce cotton or cotton goods, their climates, soils, ways and means of cultivation, manufactures, etc.

The earliest mention of the cotton plant comes from India, from which country it spread to the nearer Orient, Egypt, Greece, Rome, and Spain. In China it does not seem to have been known even in Marco Polo's time; and in Japan, although an attempt was made to introduce it as early as 800 A.D., it never amounted to anything before the re-introduction by the Portuguese about 1600. In the reports of Sir John Mandeville and his contemporaries it appears as the "plant sheep," a fabulous Oriental animal growing on a shrub or tree.

The earliest cotton manufacturing among Occidental people was found at Ulm, Germany, about 1320, and during the next three centuries that industry developed so much in various parts of Germany that even England got her supply of cotton goods from that country. The Thirty Years' War proved a deadly blow to this industry as to many others, and when the importation into England of cotton grown in her American colonies began, the foundation for the English supremacy was laid. The earliest attempts at growing cotton in America are recorded from Virginia (1621), from South Carolina (1666), from Louisiana (1697), and the first cotton was exported from Georgia by one S. Augsburger, a Swiss colonist, in 1739. The leadership of America in the production and export of cotton, however, dates from Eli Whitney's invention of the sawgin (1794), in consequence of which the production of cotton rose from two to forty million pounds during the decade of 1791–1801. At present the United States produce two-thirds of the world's cotton supply, with India, Egypt, and Turkestan as the next important producers. In manufacturing, England took the lead after the decline of the early German industries, which were carried to

Britain by the immigration of fugitive Protestant weavers from Germany, and further developed by the introduction of the mechanical processes of manufacturing. Most draconic laws were passed to prevent the communication of any information concerning spinning and weaving machines to continental Europe. Capital punishment for exporting machines was abolished only in the nineteenth century, and it needed the boycott on English goods imposed by Napoleon and the betrayal of English methods by forty English cotton workers who escaped from that country to re-awaken the German industries and to start new ones in the other parts of Europe. In the United States the first spinning machine was set up at Beverly, Mass., in 1787.

Of the almost innumerable species and varieties of cotton, five types are most generally recognized: (a) Sea Island (*gossypium barbadense*); (b) Kidney cotton (*G. peruvianum*), to which the Brazil and "rough Peruvian" belong; (c) American Upland (*G. hirsutum*); (d) Indian (*G. herbaceum*); (e) African (*G. arboreum*); each of which is adapted to certain climatic conditions and certain soils. On the whole, a warm and sunny climate, with plenty of moisture, except during the ripening of the fruit, and a light bottom soil are the prime requirements for the plant. It does not occur farther north than 37°, and cannot stand frosts. Therefore it must be sown fresh every year in the United States ; while in Mexico and other more southerly climates a plant lives through several years, occasionally up to as many as fifteen. The maximum area under cultivation at one time in the United States was 25 million acres (1/6 of the arable land), in India 18, in Egypt 1.8 million acres. Under present conditions the average revenue derived from cotton-growing will give the farmer a comfortable income, but will not make him rich. Aside from the fibre itself important industries have been started in utilizing the seeds, mostly for oil (in 1881, 90% of the oil sold as olive oil was found to be cotton oil); also for fertilizer, as food for cattle, and for medicinal purposes. The fabrication of wadding, gun cotton, collodion, and celluloid furnish important by-products.

The ethnological value of cotton rests mostly, of course, on its use for garments among the primitive as well as the most civilized nations: a curious instance being reported from a Sudan tribe who clothe their warriors and horses in an armour of cotton wadding. It is also important as a means of subsistence for one hundredth of the world's population, furnishing employment to approximately fifteen million people; and in Tibet, the Sudan, and on the Senegal River pieces and rolls of cotton are used as barter, with a fixed monetary value.

The greatest social change brought about by cotton manufacturing is the rise of the factory system, which was first applied in this industry, with all its good and evil consequences. The destruction of home industries and historical costumes by the production of an abundance of cheap, uniform dry goods, the lowering of the standard of life of a formerly rural and half-rural population by crowding them together in factories, the narrowing of their horizon by giving a whole town only one kind of employment for almost all its people, the widening of the gulf between the rich and the poor by dividing the population into capitalists and wage-earners, to the almost complete extinction of the middle classes, the evils of women and child labour—all these were first felt in consequence of the phenomenal development of the cotton industry. It is comforting to learn that in England, its oldest home, it has outgrown some of the evils attending it, and that to a great extent the cotton-workers of the great industrial centres of that country are the most prosperous, healthy, and self-respecting set of people that can be found in any industry.

Economically, almost all countries have derived and are still deriving a large part of their income from the taxes on imported cotton.

In the special geographical part of the book the United States are naturally given the most prominent place. During the last century the output of cotton in this country multiplied 145-fold, and it is still far from the limit of its possibilities. Even a moderate estimate promises fifty million bales per annum if all the available land were under cultivation. Texas alone, the youngest and already largest cotton State, could produce all of the present output of the whole country. Even the methods of cultivation are not everywhere up to date. It was not until after the Civil War that any fertilizer was used at all; even then it was often used in a haphazard way, which did more harm than good, and only through the efforts of the Government experiment stations have more rational methods been adopted in recent years.

While formerly the South produced only for exportation to the North or abroad, it now has a young and promising industry which already manufactures one-fourth of American cotton goods. England has materially decreased in the last decades as a consumer of American cotton—from 66% of the American exports which it bought in 1870, it had gone back to only 39% in 1900. The Pacific ports have received a good customer in Japan; but she may soon have enough of Indian and home supply not to need any more American raw material.

India, the cotton country next to America in importance, is both a producer and a manufacturer and exporter of cotton, with Bombay as its industrial centre and chief port. The factories, which were started with English workmen, are now filled almost exclusively with natives. The industry is largely handicapped by bad roads; the harvest, by Hindu holidays, which often coincide with the height of the harvesting season. In spite of that, India possessed, in 1900, 186 factories, with 4.7 million spindles and 38,420 mechanical looms. The old Indian home industries have been almost entirely supplanted by the work of the mechanical loom.

Of the other Asiatic countries Persia, and especially Turkestan, promise to become powerful rivals of this country in the production of raw material, through the attention paid and the encouragement and material aid given to the cultivation of the plant by the Russian Government. A constant increase of the number of good roads, low railroad rates, financial aid to the poor planters, and the work of an experiment station established in imitation of those of the United States, have already enabled Russia to grow almost all of its own cotton, and European Russia has conquered the former place of France in the list of the world's cotton-manufacturing states—England, United States, Germany, Russia, France.

In China and Japan cotton has supplanted silk to a great extent; some is grown at home, the larger part imported, mostly from India. In South America, Peru and Brazil show an encouraging outlook; in North America, Mexico has made a good start, both in growing and in manufacturing cotton, and in Canada a considerable industry has lately sprung up.

In Europe, England leads in the production of cotton goods and in the condition of its cotton-workers. In the last decades Germany has become her most powerful rival, and Switzerland and France excel in the finest cotton fabrics, which, in the former country, are to a large extent still made by hand.

As a book of reference, this volume certainly has no equal in the market. There are some repetitions, of course, as certain chapters are likely to overlap in a book of that size. A large supply of good illustrations and maps, many of them original, a very complete bibliography, and an alphabetical index greatly add to its usefulness.

M. K. G.

Der Suezkanal. Seine Geschichte, seine Bau- und Verkehrs-Verhältnisse und seine militärische Bedeutung. Von Albert Ungard, Edler von Öthalom. viii and 104 pp. and 6 maps in colours. A. Hartleben, Vienna, 1905. (Price, M. 4.)

The author remarks in his preface that, hitherto, no German handbook has been prepared treating exhaustively of the various conditions that brought the Suez Canal into existence. This book affords a systematic and thorough treatment of the whole great enterprise, beginning with the history of the old canal that was actually in operation many centuries before the Christian era. The political and financial preliminaries to the building of the present canal, the geology and topography of the Isthmus of Suez, the canal construction and the development of the ports, the Sweet Water Canal, the transit conditions, the economic and military significance of the work, and the international and maritime questions involved are all fully described and discussed. The maps are excellent, and will rank among the best for general use. The book is a scientific as well as a popular description of all phases of the Suez Canal.

Les Chemins de Fer coloniaux en Afrique. Par E. de Renty. Première Partie : Chemins de Fer des Colonies Allemandes, Italiennes et Portugaises. viii and 154 pp. and 8 sketch maps. F. R. de Rudeval, Paris, 1903. (Price, fr. 1.50.)

Deuxième Partie: Chemins de Fer dans les Colonies Anglaises et au Congo Belge. 337 pp. and 9 sketch maps. 1904. (Price, fr. 3.50.)

Troisième Partie: Chemins de Fer dans les Colonies Françaises. (To appear.)

The main ideas upon which these volumes are based are (1) that Africa is rich in a great variety of resources that, if properly developed, will enrich the colonial Powers which divide the continent among them; and (2) that the railroad is certain to be the most powerful agent in this development. The author, Captain de Renty, of the French army, also emphasizes the idea that the benefits to be derived by the colonial Powers from the development of their possessions will consist as much in the creation of new needs among the populous native tribes, thereby opening new markets for European manufactures, as in the exploitation of the natural resources of the colonies.

These ideas are well founded, according to the testimony of the leading authorities on Africa; and upon them as the groundwork of his studies the author has given, in the first two volumes of his series, a careful and able treatment of the economic conditions in those parts of Africa under consideration, as well as the history of the remarkable railroad enterprises now in progress.

Captain de Renty treats in turn the colonies of each of the Powers, beginning with the German possession of Togo. Does the climate of Togo, for example, adapt it for European colonization, or must it remain a colony of commerce and plantations? Is the seaboard favourable for the development of ports? Are the rivers adapted for commerce; what are the present trade routes; can horses and cattle thrive, or is man the only means of transport? About what is the density of population; what are the commercial resources, and the amount of the import and export trade; what is being done for general development, either by Governmental or private enterprise? Upon such broad foundations as these the author gives the history of the railroad enterprises, in progress or projected, in each of the colonies, with comments or criticisms of his own and many citations of the views and policies of Governments and of the opinions of leading men.

At the end of most of the colony chapters the author gives the conclusions he has reached from the facts collated and a list of the works he has consulted. He thinks that the very tardy development of railroads in German East Africa is a mistake, inasmuch as the superior enterprise of the Congo State in the west and of the British colonies in the north and southwest are already providing outlets for the products of the German colony; that Italy is wisely planning to complete the mastery of her small possessions by means of the railroad and locomotive; that Portugal has not yet proved her ability to give to her rich territories the intensive and rapid development required by the necessities of modern economic life; and that the broad and energetic railroad policy of the Congo State bids fair to hasten the organization, in an admirable manner, of all its material interests, and make the territory of vast importance to Belgium. The author has only words of praise for the far-sighted railroad policy of the British and the rapidity with which they are carrying it into effect.

Captain de Renty is the first writer to treat this great phase of African development with fulness and adequate grasp. His book fills a need in African literature, and the concluding volume will be awaited with interest.

Tales from Old Fiji. By Lorimer Fison. xlv and 175 pp., 22 Illustrations, Appendix, and Index. Alexander Moring, Ltd., The De La More Press, London, 1904. (Price, 7s. 6d.)

This collection of Fijian legends, most of them narrated to the author by Taliai-tupou, the King of Lakemba in the eastern group of the Fijis, is interesting reading, and worthy of record as a contribution to our knowledge of a vanishing people. It includes twelve stories, an introduction in which the writer throws light upon the characteristics of the Fijians by an examination of many words in their language, and an appendix descriptive of some of their customs and arts. He selects a considerable number from the large class of old Fijian words that are innocent in themselves but contain an evil secondary meaning, and thus adduces strong evidence that the old Fijian heathen, in spite of his pleasing exterior of which explorers wrote, was as debased and brutal a savage as can be imagined. "Thotho," for example, means the dried grass that is strewn on house-floors, but its other meaning is the women who were strangled and then buried in a chief's grave. Such words show that the introduction of Christianity had a humanizing influence, and led to the abolition of abhorrent practices.

Doubts have been expressed as to the authenticity of statements concerning Fijian cannibalism, but the author says that many words more than substantiate the most revolting accounts that have been published; and some of the words seem to bear out the theory that cannibalism in the islands arose from the strongest motive, and that is hunger. Many legends are good stories as well as valuable for ethnological material. If the schoolmaster had not reached Tonga, no doubt its legend (here included) as to the origin of Napoleon would have become veracious history handed down from the fathers. According to this story Napoleon was the son of a Tonga mother, with whom he was living in Merikei (America), when the men of Faranise (France) came seeking him to save them from their enemy Uelingtoni (Wellington):

> I could tell you of his mighty deeds—how he smote the enemies of Faranise, though they were many and strong; how he chased Uelingtoni from land to land, till he caught him at Uatalu, and banished him to a desert island, where he died.

BULLETIN

OF THE

American Geographical Society.

Vol. XXXVII **1905.** **No. 9**

THE MOUNTAINS AND KIBITKAS OF TIAN SHAN.

BY

ELLSWORTH HUNTINGTON.

Since the completion of the Central Asiatic Railroad the interior of Russian Turkestan has become as accessible as the remoter portions of our own Southwest. Russian rule is firmly established, and the only difficulties are the inevitable ones which beset the traveller who journeys among the mountains or with Oriental servants. One day, for example, our capable head man, a Sart from Andijan, was told to buy some meat to be used to-morrow:

"Oh," said he, "that is unnecessary. God will provide meat when we need it."

"Yes, but he wants us to make what provision we can for the future."

"No, not at all," answered the Oriental, "this morning when we had no meat did not the Russian officer who is camped close by send us some? And when he had no bread did we not give him a supply? God will provide."

The difficulties afforded by the mountains are more formidable than those afforded by the people. Snow and ice frequently compel a change of route among the higher mountains, and the passage of rivers is often difficult. South of Son Kul Lake, for instance, the Narin River, one of the chief tributaries of the Syr, or Jaxartes, wanders over a broad gravel flood-plain in numerous channels which split and reunite again and again in a braided pattern. When we crossed the river during the first week in July an early start was wasted, for we had to sit down on the bank and literally let the stream flow by until its level was lower. The water of the river is largely derived from melting snow, and naturally the supply is

greater in the middle of the day than at sunrise after the low temperature of the night. The low water of a given sunrise gets to the Son Kul ford at from ten to twelve o'clock the following day. At nine o'clock the stream was low enough to allow a start. Nearly an hour was required to cross all the little channels into which the muddy river is divided. In the broad main channel we zigzagged up and down for more than fifteen minutes as the Kirghiz guide skilfully led the way from one gravel bar to another—now against the cold torrent, now with it, and sometimes even back a little toward the bank from which we had started.

In spite of, or perhaps because of, slight difficulties travelling among the Tian Shan Mountains during the summer is delightful. The journey, of which some results are given in this article, was made as a part of the work of the Pumpelly Expedition of the Carnegie Institution of Washington. Starting from Andijan, at the terminus of the Central Asiatic Railroad, in late June, 1903, Professor William M. Davis, of Harvard University, and myself made our way northwestward across the western end of the Tian Shan Mountains past Son Kul (Kul-Lake) to Issik Kul, where we separated, he to go north into Siberia, I south into Chinese Turkestan.

The physiography of the portions of the Tian Shan Mountains which it was our privilege to see has been described in reports published by the Carnegie Institution. In the Geographical Journal for December, 1904, I have attempted to show the relation between the main physiographic facts and the main ontographic or animate facts. In the present paper the same subject will be continued. The main physiographic feature of the western Tian Shan region is that the so-called mountain system is in reality peneplain, or region of low relief, with residual mountains of harder rock rising above it, which has been uplifted to an average height of ten or twelve thousand feet, forming a great plateau. The uplift was accompanied by warping which has divided the plateau into a series of basins and rolling bridges or uplands, none of which are as yet extensively dissected by the revived and encroaching rivers. Thus a large part of the western Tian Shan region consists of smoothly-floored basins and gently-rolling uplands lying at a height of from ten to twelve thousand feet and therefore subjected to a relatively heavy precipitation. The conditions of climate allow an abundant growth of grass, but no trees in the parts of the plateau which are free from snow during a few months in summer. Thus the first and most important result of the uplifted peneplain upon life is the vast plains of rich grass which the Kirghiz call the Sirt. The grassy

plains in turn influence animal life, including man. The climate is so cold, and snow lasts so long, that wild animals cannot inhabit the Sirt in great numbers unless they hibernate, like the marmot, or migrate, like birds; and even the latter cannot find food easily because of the scarcity of insects and of weeds with large seeds. Therefore animals are rare, although the conditions are almost ideal for herbivorous species during the summer months. Man has taken advantage of the favourable conditions, and brings his flocks of domestic animals to the Sirt every summer, returning with them to the warmer lowlands in winter. Nomadism is the only condition under which the human occupation of most of the Tian Shan plateau is possible. It is the main fact in the lives of the people, and determines not only their style of food, clothing, habitations, household economy, and commerce, but also their art, and their character as to industry, bravery, and hospitality, and even as to still higher moral qualities. The Kirghiz are so primitive, their manner of life is so simple and so closely bound up with their physical surroundings, and they are so little influenced by outside forces, that they furnish an unusually good example for the study of the influence of environment on human life.

The Migrations of the Kirghiz.—It is easy to see that the migrations of the Kirghiz are the direct result of their physiographic environment, and that their habitations and furniture must be such that all the household property can easily be carried from place to place. The effect of environment upon the character and manners of the people is harder to estimate, but must be equally real. The necessity that all should engage in the same sort of work in the presence of the others, whether rich or poor, develops the spirit of democracy and equality which is noticeable among the Kirghiz. The frequent movement from place to place and the contact with many people develop a spirit of sociability and hospitality. A description of some of the events of two days in early July, when we travelled from the Narin River up to Lake Son Kul, will illustrate these points, and give an idea of the daily life of the people.

From the ford of the Narin River an easy ride up a pretty mountain valley brought us to a group of kibitkas, or round felt tents, set in a green amphitheatre surrounded by steep walls of gray limestone. An unusually neat kabitka, so new as to be still white, stood apart from the rest, and had evidently been prepared for the foreigners at the suggestion of the Kirghiz who had of his own accord ridden ahead that morning to see that all was ready for our reception. The kibitka had been picked up bodily and carried to

a cleaner spot away from the unpleasant neighbourhood of the other kibitkas and of the flocks and herds. When a dwelling is to be moved a short distance a dozen men and women go inside, pick up the kibitka by the lattice-work fence which forms the framework of the lower wall, and, under the direction of a man on the outside, who acts as eyes for the rest, carry it blindly to the designated spot. It looks like an enormous beetle, walking across the turf with a dozen pair of human legs. The household goods which the kibitka had sheltered—the piles of rugs, felts, quilts, skins, boxes, bags, wooden bowls, and leather buckets—are left exposed in a sorry heap, which the women good-naturedly remove to another tent.

In the evening our Kirghiz village was in perfect order. In the centre of the valley ten or fifteen kibitkas were scattered on a fair green slope. On one side hundreds of stupid sheep were trying to push their way into the centre of the flock; on the other herds of neighing horses and stolid cattle were interspersed with camels—awkward two-humped beasts, strangely out of place among the lofty mountains, and ridiculous in felt coats put on to keep them warm. In the morning the village was in dire confusion. Kibitkas were lying in pieces on the ground with household goods strewn around them. A migration was to take place, and men, women, and children were busily making preparations. The slow-moving flocks of sheep had already been sent away at dawn, but the rest of the animals disported themselves among the ruins of the tents, waiting to be packed or ridden.

The men of the community were clad in big top-boots, black conical hats of heavy felt with brims of Astrakhan, and long quilted cotton gowns which had been wet so often as to appear dark and oily. Their chief business seemed to be to load the animals or to catch those which were still loose. When a horse was to be caught a man seized a pole like a fishing-rod with a loop of rope at the end and jumped bareback on a horse which was already bridled. Violent kicking and lusty shouting started both horses into a fine gallop, and it was sometimes half an hour before the loop was thrown over an animal's head.

The women wore heavy boots and quilted gowns much like those of the men. Many, however, had taken off the outer garment and were dressed in loose gowns of white cotton, or, in the case of the rich, of gorgeous silk, red, purple, and yellow. The sleeves of the garments of both sexes extend five or six inches below the hands and take the place of gloves as a protection against cold, especially in riding horseback. The head-dresses of the women, often a foot

high, are wonderfully constructed of fold after fold of white cloth wound into a cylinder. One fold hangs over the ears and under the chin in such a way that it can be drawn up across the lower part of the face, although this is rarely done. From below the huge head-dress the black hair hangs in braids, to the ends of which is attached a cord or piece of leather studded with silver. At the end of the cord, close to the woman's heels, dangle one or two silver rubles and the keys to all the family chests.

When a kibitka had been tied ready for packing, a tiny girl of six led up a camel ten feet high, and, in spite of the creature's horrible grunts and roars, made it kneel meekly as she twitched the rope fastened to a stick in its nose. The saddle of the largest, finest camel was decked with a long red fringe, which reached forward along the animal's curved neck to its head. When a load of pots, pans, boxes, felts, and parts of a kibitka had been tied securely, I saw a silk-gowned mother lay her baby in a wooden cradle without rockers. After covering it well, she tied one rope over its legs and around the cradle, and a second over its chest. Then in spite of its lusty crying she lifted the cradle unconcernedly to the top of the camel's load, lashed it on, and covered both baby and load with a large rug. Camels are not the only baggage animals, although horses are esteemed too highly to be often burdened with loads. It was no unusual sight to see a man on one side of a stout ox and a woman on the other, each with the right foot braced against the animal's side while they drew taut the ropes which bound the load of kibitka poles. A monkey-faced dog slunk behind one such pair, while close by a girl of ten in figured red and purple silk waited to be helped on her horse. Beside her a tiny imp of three stood motionless, his round, astonished face, long gray dress, and funny high boots sinking into insignificance under the immense dome of black sheepskin which served as a hat.

At last, when all was ready, we started on a delightful ride up a steep gorge, where the road zig-zagged among fine spruce trees, the first that we had seen. A Kirghiz migration is a sight which never grows monotonous. First we passed a man on a cow, then a heavily-loaded camel with two small boys perched high on top of the load and two ridiculous baby camels, too small to carry even a roll of felts, running awkwardly in the rear. Next two fat cows, with wooden rings in their noses, walked placidly along with loads of straw-matting and poles. In front of them an old gray-beard with a black hat and a wadded gray gown rode proudly on a spirited horse. His gloved right hand rested in a wooden crotch supported

by a little stirrup, and on his wrist was perched an eagle, with a leather hood over its eyes. Behind the man stood a four-year-old urchin, a miniature of his grandfather, his feet planted sturdily on the horse and his hands firmly grasping the old man's shoulders. Ahead of this pair a ragged lad, mounted bare-back on a yearling steer, jogged along contentedly behind a herd of horses and colts. In spite of his rags he looked happy, well fed, and warm. So, too, did all the people on that day's march; and, indeed, all the pastoral nomads whom I have ever met seemed to be comfortable. When their flocks diminish and they grow poor they are obliged to betake themselves to agriculture, leaving only the rich to continue the nomadic life.

When we crossed the pass at the head of the valley and entered the basin of Lake Son Kul, 10,000 feet above the sea, the scenery suddenly changed. From the contracted limits of a young steep-sided gorge we suddenly emerged into the mature topography of a gently-sloping green country full of marshy places and of brooks which ran half hidden among the grass. We had passed from a young valley of the present cycle of erosion into a basin where the ancient topography is largely preserved. Although the season was early July, bits of fresh snow lay a few hundred feet above the lake, and the soft turf was thickly set with the flowers of early spring. Rain fell almost daily while we were in the neighbourhood, and there were frosts at night.

The basin of Son Kul is the favourite pasture-ground for the Kirghiz of a large district. When the snow disappears in the middle of June they bring their cattle and sheep to feed on the rich grass and remain in the neighbourhood till snow comes again in September. Every two or three weeks each camp is moved a few miles to a fresh spot, both for the sake of new grass and for cleanliness. The summer months are the social season of the Kirghiz. The comparatively well-to-do people who come to Son Kul migrate to the lake from every direction. As each group of relatives pitches its camp where it pleases, and as the location of the camps is often changed, people from all parts of the country become acquainted with each other. The men invariably have plenty of time to talk and drink tea; the women work more steadily, but nevertheless have time for visiting, and one occasionally sees parties of them making calls on horseback.

The Effect of Glaciers and Glaciation on Physiographic Forms.—Under the present climatic conditions of Turkestan, glaciers are of small importance in their effect on life of any kind. So far as

man is concerned, their chief importance is that their presence or absence determines the location of roads, and certain regions which might furnish good summer pasturage are left untenanted because of the difficulty of driving flocks across the surrounding glaciers. The more extended glaciers of the past, however, and the climatic changes, of which the glaciers were the accompaniment, have produced physiographic features which are of great importance in the life of the Kirghiz of to-day.

These features divide themselves into three types: First, ancient moraines at the heads of the higher valleys; second, terraces along the middle portions of valleys at the heads of which glaciation may or may not have taken place; and third, extinct lakes at the lower ends of streams which terminate in closed basins. The formation of lakes and of moraines needs no explanation; the terraces are not so generally understood.

The valleys of Turkestan and of other portions of Central Asia are almost invariably terraced. The terraces are of three kinds, differing in composition, but apparently due to the same climatic cause. The first type of terrace is cut partly in rock and partly in a cover of stream-laid gravel, and is found among steep young mountains where the streams are actively deepening their channels without wandering much from side to side. The second type is cut wholly in stream-laid gravel, and is found in valleys which are still young, but have reached the stage where the streams begin to broaden their channels as well as to cut downward. The third type is cut in stream-laid gravel lying unconformably upon fine silt, and is found among mature mountains, especially in very arid regions. It has generally been assumed that such terraces as those of Turkestan are due to warping of the earth's crust, but this explanation is unsatisfactory. The terraces occur with such uniformity of type and number in widely-separated regions, and in valleys which interlock so intricately that, if they are due to warping of the crust, the warping must have been of identically the same rhythmic type over an area extending at least twelve hundred miles east and west, and eight hundred north and south. Yet the warping must have been so adjusted to the minor features of the earth's surface that it caused similar acceleration or retardation of the streams in all the valleys, no matter in which direction or to what destination the water flowed. Such a warping of the earth's crust is contrary to what we know of the nature of earth movements in other places, and is practically impossible. Accordingly, we are forced to conclude that the terraces are due to the climatic

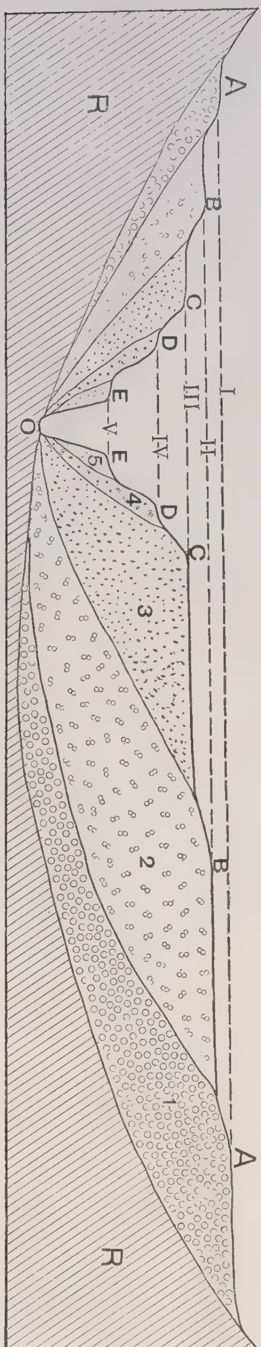


FIG. 1.—IDEAL CROSS SECTION OF THE TERRACES OF THE KUGART VALLEY.

A, B, C, D, E: Terraces. —— I, II, III, IV, V: Levels to which the valley was filled with gravel during successive glacial epochs. 1, 2, 3, 4, 5: Gravel fillings of the glacial epochs. —— R: Bed rock.

changes which took place in Central Asia during the Glacial Period, as is proved by ancient moraines and extinct lakes.

The formation of climatic terraces seems to be due to the fact that during glacial epochs the rate of weathering of the rocks was more rapid than during interglacial epochs. In this way the streams coming from young mountains, with slopes so steep that they could not possibly become graded, were heavily loaded, and compelled to deposit the coarser part of their loads. The deepening of the channels was checked, and the streams began to cut laterally. When a dry epoch ensued the streams returned to their former condition. The deposits of gravel were dissected and terraces were formed, consisting wholly of gravel if the streams during the drier times were in a graded condition (see Fig. 1), or of gravel overlying rock if the streams were in the condition of active vertical erosion. In regions where the mountains are mature and the climate is normally arid, the rock slopes of the mountains are ungraded and naked during interglacial periods, but become graded under the moister conditions of a glacial epoch. On the return of drier conditions, however, the loose soil and rock fragments which have accumulated during the previous epoch are washed away because of the drying up of the vegetation which held them in place. The

streams are thus heavily loaded, and are obliged to deposit part of their load upon the fine flood-plain deposits of the preceding epoch. Soon, however, the loose materials upon the mountain sides are washed away entirely, and the load of the streams is limited to the relatively small amount of detritus derived from weathering under arid conditions. Under such conditions the load is not equal to the capacity of the streams, and the latter begin to erode and deepen their channels. Thus terraces are formed, the upper part consisting of gravel, the lower part of the finer deposits of the previous flood-plain. A repetition of the terracing process during successive pairs of glacial and interglacial epochs causes a series of terraces in each valley. The diagram (Fig. 1) illustrates how this takes place in the case of a valley where the terraces are composed wholly of gravel. At the beginning of the first terrace-making epoch the stream may be in any part of the valley, and the terraces on the two sides may be of very unequal width. In some parts of Turkestan the terraces form broad plains, elsewhere they are reduced to narrow strips. Their number is usually from three to five, although sometimes they all disappear; while at other times the number reaches six, or even seven. Occasionally they are connected with moraines at their upper ends, or with lake terraces at the lower ends, showing that they were in process of formation at the same time as the better-known features which characterize the Glacial Period.

The Effect of the Glacial Period on Human Life.—The effect of the Glacial Period on human life may be divided into two parts—namely, the results due to physiographic features produced by the climatic changes of the Glacial Period and still directly operative; and the direct results of the climatic changes upon ancient man, now operative only indirectly through heredity. Of the latter almost nothing is known, although a few phenomena, to be mentioned later, suggest that even during historical times the climate of the Tian Shan Mountains may have been different from now, although far from being what is usually understood by the term "glacial." The physiographic features due to the climatic changes of the Glacial Period have already been classified as moraines, terraces, and extinct lakes. Their influence upon life is secondary to that of the plateau character and climate of Tian Shan, but, nevertheless, it is one of the factors which have helped to determine the present condition of life, both animal and vegetable.

On the whole, the Glacial Period has produced results which are

beneficial to the human inhabitants of Tian Shan to-day, however disagreeable they may have been to the people, if any, who were obliged to endure its rigours. In the first place, the roads are better because of the Glacial Period. Near the heads of the streams flat-floored glacial valleys form broad, easy approaches to the high passes, quite different from the narrow, inaccessible gorges which would otherwise exist, and which do exist, in many cases just below the limit of glaciation. The moraines, too, with the exception of the younger ones, furnish easy locations for roads, in spite of the fact that their topography is irregular. Farther down stream the terraces supply ideal locations for roads, and one can often travel for miles without any of the hindrances which are met in ordinary mountain valleys, and which are abundant in Tian Shan as soon as one reaches a place where the valley is so narrow or the stream has swung so far to one side that the terraces are wholly consumed. In such cases the roads must wind up and down over rugged and precipitous rocks. One realizes at once that if the roads were everywhere as difficult as in these places where the effects of the Glacial Period have been obliterated, the migrations of the Kirghiz would be much more arduous, and therefore, it is safe to say, less frequent.

In the next place, because of glaciation, the valleys are more productive. The bottoms of the glaciated troughs in the higher mountains are smooth and broad, and rich grass grows where nothing but stones would be found in an unglaciated country. The smoothly-graded hills and hollows of the old moraines also furnish the best of summer pasture for the flocks of the nomad Kirghiz. So true is this that one acquires the habit of looking for a group of tents as soon as he encounters a well-weathered moraine. Lastly, the gently-sloping plains of the terraces provide ideal sites for winter villages, especially where neighbouring mountains furnish abundant water for irrigation and are easily accessible for the summer migrations. Fine examples of all these features are found in the Alai region, which lies south of the Tian Shan plateau, but is of the same type physiographically and ontographically. One of the most attractive "yailas" or summer camps of the Kirghiz that I have seen was in the hanging valley of Bursundu, at the west end of the Alai Valley. From the broad glaciated valley of Kok Su, with its moraines and cultivated terraces, a rough narrow gorge led up to a small moraine, above which was the smoothest and greenest of flat-floored valleys. Horses, sheep, camels, and cattle grazed peacefully among the dark-gray kibitkas which dotted

the rich sod. A brook of the clearest, coldest water formed a thin black line as it twisted and wriggled this way and that among the overhanging turf, as though loath to leave the pleasant verdure and enter the naked gorge. Not far from Bursundu the moraines of the Alai Valley are equally beautiful during the warm season. As one rides among them in the fresh mountain air there is a sense of space and freedom, and the varied topography furnishes a continual incentive to move on. From one grassy hill-top a new pond appears, from another a herdsman mounted on a yak and following a flock of sheep, or a kibitka with a group of women sitting outside it and making the coloured felts which are so prominent an article of Kirghiz housekeeping. Farther down the valleys the terraces are scarcely less attractive. At the village of Jekendy a broad terrace plain is covered with heavy crops of the hardier grains and of grass. Scattered here and there are houses of mud, the flat roofs of which are hidden under huge stacks of hay stored against the winter, when the glacial valleys and moraines must be abandoned and the flocks must be brought to winter quarters. Overlooking and encircling the haunts of the Kirghiz, the mountains rise grandly into peaks whose beauty is enhanced by the glacial carving to which they have been subjected. Their subtler influence joins that of the glacial troughs, the moraines, and the terraces in making the life and character of the Kirghiz distinctly different from what it would be if there had been no Glacial Period in recent geological times.

The Salt Lake of Shor Kul.—The terraces which surround the salt lake of Shor Kul, eighty miles northeast of Kashgar, prove that during the Glacial Period the lake was more extensive than at present. To-day it is a small body of water, about ten or twelve miles east and west by two or three miles north and south. Shor Kul means salt lake; and the name is eminently deserved. I saw it in August, 1903, during a time of unusual rains. The water was so full of salt that it resembled a New England pond which had been frozen clear to the bottom and was now flooded by a March thaw. On the borders, black, ill-smelling muck dipped under the water so gradually that it was impossible to say just where the lake began. Out over the lake the dull gray of the lifeless brine was broken only by two or three little green islands a mile or two away, and by a salt gathered far from the shore. With his great hoe the man scooped up a mass of salt crystals mixed with mud. Then with a skilful twist he rinsed the salt clean, and poured it into one of the bags on the back of the patient wet donkey which was to carry it to market at Kashgar.

Between the shore of the modern lake and the abandoned ancient shore-line lies a plain, mostly swamp, which may justly be regarded as a product of the Glacial Period. It is composed of yellowish clay silt caked with salt, and is merely the dry bed of the lake of glacial times. On one side the lake presents a lifeless expanse of brine; on the other the country is composed of broad stretches of subangular gravel devoid of vegetation, except a few bushes and a low, sweet herb. Between these two desert regions, however, the ancient lake-bed itself is full of vegetation. On the drier edges the vegetation consists chiefly of low bushes with a profusion of insipid berries, resembling the huckleberry in appearance. In other places, where the plain is smoother and better-watered, vegetation is luxuriant, and the country is what is called a swamp. Often the surface is dry for months; but it is inundated at certain seasons, and there is always water below. The most abundant plant is the feathery tamarisk, with its spikes of beautiful pink flowers turning to delicate shades of red and brown as they grow older. Between the tamarisk bushes tall reedy grasses, with edges which cut like knives, sprout abundantly, and are interspersed with weeds bearing yellow and purple flowers. Occasional springs form the centres of turfy marshes, where the fresh water of the springs washes away the salt and permits the growth of ordinary grass. In many places the swamp is diversified by low hills or flat tables several miles broad, rising twenty or thirty feet above the swamp. Their greater elevation causes them to be covered with a less dense growth of tamarisks and grass, which are in part replaced by berry bushes and knotty poplars resembling the cotton-wood. The trees stand from twenty to a hundred feet apart, with many bushes and dead trees between them. The scenery has an open pasture effect, which is very pleasing. Even in the swamp the views of waving tamarisks and bright flowers are pretty, even if limited and unvaried.

The springs of the Shor Kul swamp have the remarkable habit of frequently appearing upon hills. At the village of Jai Tepeh, for instance, the hospitable Minbashi, or headman, took me at once to view the wonder of the village, the five springs of sweet water which well up on the sides of a little hill about twenty-five feet high. For miles around there is a smooth plain with very few springs, but here on the hill the water bubbles up with considerable force, and the same thing occurs in several other places. The hills are composed of gravel or sand; the plain of fine clayey silt. During an interglacial epoch, or before the Glacial Period, the coun-

try appears to have been so dry that sand and fine gravel were deposited subaerially, forming a plain at the level of the present hill-tops. Under changed conditions the plain was thoroughly dissected, leaving only hills and low plateaux. Next the lake rose during a glacial epoch, and the sand and gravel were covered with clayey silt, which is impervious to water. The hill-tops, however, were not covered with silt, or were so thinly covered that the underlying coarser material was soon exposed once more after the retirement of the water. Now rain-water and the drainage of the mountains enter the gravel at A, Figure 2, and flow easily through

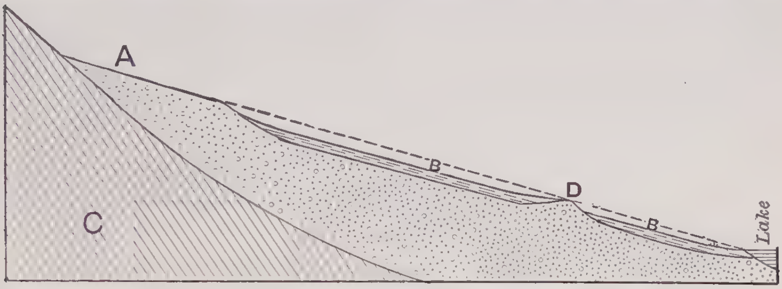


FIG. 2.—CROSS SECTION TO ILLUSTRATE THE SPRINGS OF THE SHOR KUL SWAMP.

the relatively coarse material of the subaerial deposits, but cannot get out through the impervious clay, B, above, or through the rock beneath (C). Finally the water reaches a little hill such as D, where the clay is either absent or dissected, and, being under pressure, bubbles up in a natural artesian well.

From the foregoing description it appears that the swamp of Shor Kul, with its peculiar vegetation and its unusual springs, is due to the changes of climate which took place during the Glacial Period. An indirect effect of the changes can be seen in the influence which the swamp has had upon the human inhabitants of the region. The people of Shor Kul are Kirghiz who settled there a few generations ago, coming from the north from the plateau of Tian Shan. They are of precisely the same stock as their mountain neighbours, and, so far as I know, have been exposed to the same conditions, with the exception of those which pertain to the character of the country which they inhabit. Accordingly, unless the people of Shor Kul were originally different from those of Tian Shan, it is a fair inference that any differences which now exist are due to present environment. The people of Shor Kul are under Chinese rule, and those of Tian Shan under Russian, but it is not probable that this has as yet produced any marked

effect. Moreover, part of the Tian Shan Kirghiz are under Chinese rule; but they do not seem to differ greatly from their neighbours, although, on the whole, they appear poorer, and possibly somewhat more suspicious and less hospitable.

The Kirghiz of Shor Kul still consider nomadism the ideal life, and some of the richer members of the community go to the mountains. The majority now spend all the year at Shor Kul; some of them living always in one place, others moving about within a very circumscribed area. The round kibitka is still used, but houses of mud are more common, and are inhabited even in summer, which is rarely the case among the true nomads of the mountains, even though they have houses for winter use. One reason for the greater use of houses at Shor Kul may be the mosquitoes, which are innumerable, especially near the springs, where of necessity the villages must be located. There is less life and movement among the people and less travelling from place to place, partly, perhaps, because the roads in the swamp are exceedingly muddy whenever it rains, and locomotion for such animals as sheep is almost out of the question. With the tendency to a more sedentary life, and perhaps because of it, there come a greater curiosity, a greater tendency to stand and stare at every act or gesture of strangers. The Kirghiz of the mountains are interested in seeing strangers, but they are polite in their way of manifesting their interest. Hospitality is still a virtue of the people of Shor Kul, but it is less spontaneous than among their cousins of the mountains and more restricted to men of influence. It is a necessity among people who travel much, but becomes a luxury among those who usually stay at home.

Since the Kirghiz came to Shor Kul it is hard to say whether industry has gained or lost. Everywhere the Kirghiz are lazy, according to Occidental standards, although they work with remarkable energy at times. At Shor Kul agriculture is more important than elsewhere, and requires more steady application to work than does the care of flocks. The number of animals owned by the sedentary people is naturally less than among the nomads, and the kinds are different. Donkeys, which the nomads despise, are freely used at Shor Kul; but camels are rare, because the mud is often so bad that they are helpless. Sheep, too, are less abundant, and naturally the amount of meat and milk consumed is far less than among the mountains. Yet, in spite of changes, old customs persist with great tenacity. The nomad in the treeless mountains is obliged to resort to dried dung for fuel. The people of

Shor Kul preserve the same habit, in spite of the fact that there are hundreds of trees, many of them dead and fallen, within a few miles of the villages, and although dried dung is a very inconvenient form of fuel, and produces a most disagreeable smoke.

Perhaps the most marked result of the partial change from a nomadic to a sedentary life is the lessened freedom of the women. Among the nomads, one sees them continually engaged in their household tasks. They converse freely with the men, and make no attempt to keep themselves hidden. At Shor Kul, on the other hand, wherever permanent houses have become the rule, they remain for the most part within doors, and when obliged to be out of doors take evident pains to avoid the gaze of the men. They are beginning to fall into the deplorable condition of women in other Mohammedan countries. It is hard to say to just what extent the differences between the Kirghiz of Shor Kul and of Tien Shan are due to differences of environment; but it is at least worth noticing that where the Glacial Period caused the formation of the extinct lake of Shor Kul, and thus produced unusual physiographic conditions, the people who have for a few generations been subjected to the new conditions begin to show changes in their method of life, and even in character.

The Lake of Issik Kul.—The most important lake of Turkestan is Issik Kul, a sheet of water one hundred and ten miles long from east to west, and from eight to thirty miles wide. It lies at a height of 5,180 feet above the sea, in a region of rainfall so moderate as not to allow of agriculture without irrigation. On either side rise snow-covered mountains to a height of 14,000 feet or more. The traveller who expects to find a genuine mountain lake, however, will be disappointed, at least if he approaches from the west end, as we did. Issik Kul, like most of the lakes of Asia, is smaller than formerly, and lacks the beauty of a body of water which fills its basin to the brim.

Leaving the half-buried spurs of the block-fault mountains on the southwestern border of the Issik Kul basin, one emerges upon a broad stretch of piedmont gravel, much of it rough, angular, and shining black with "desert varnish." Lakeward the gravel passes into silt covered with bushy vegetation, and, finally, two or three miles from the base of the mountains the lake is bordered by a tract of marsh. The silt between the gravel and the marsh is utilized by the Kirghiz for their primitive agriculture. The system of irrigation is extremely crude; and the fields of peas, wheat, and barley are often so weedy that one is puzzled to know where the

cultivated land begins. In summer, part of the Issik Kul Kirghiz migrate to the mountains, and part to the marshy lands along the lake shore. In each village two or three of the poorest men are left to tend the irrigation canals. The villages themselves are merely scattered collections of cattle yards, surrounded by walls of mud and brush, inside which the kibitkas are pitched in winter. The people of Issik Kul are less purely nomadic than some of the Kirghiz, but they do not show the tendency to change which we have found at Shor Kul.

The western portion of Issik Kul is uninteresting, and the flat shore forms smooth, unbroken curves. Toward the middle of the lake, however, the bands of marsh and of silt described above disappear, the smooth slopes of naked gravel are covered with green fields and trenched by small valleys, and the bold shore becomes sinuous with high promontories and pretty bays. Farther east, the shore-line becomes still more irregular, and is characterized by long finger-shaped fiords, which indicate that the region has been depressed so that the valleys are drowned. Instead of the dull scenery of the western end of the lake, or the pretty but not unusual views of the central portions, the eastern end possesses a unique and unexpected beauty. A mile or two from the water one enjoys a pleasant prospect of smooth, green plain, fertile, well tilled, and dotted with the villages of lately-arrived Russians, or with lines of ancient mounds running nearly north and south. Suddenly, however, the plain is broken by a deep fiord, a lane of water between steep green walls from fifty to two hundred feet high. The limited but wonderfully beautiful scenery of the fiords is in utter contrast to the broad views of green plain, white mountains, and blue lake which lie just above. The little bays, the bushy shores, the long, winding pathways of clear water, and the waterfowl which fly up from lake or marsh entice one onward against his will to see what new beauty lies concealed. The cause of the marked difference between the two ends of Issuk Kul is that in recent geological times the whole region has been tilted up on the west and down on the east, so that at the western end the uninteresting lake bottom is left exposed, while at the eastern end the valleys have been drowned and beautified. To-day the monotonous western end is left to the Kirghiz, but the attractive eastern end is the seat of several Russian colonies, chief among which is the prosperous little town of Przhevalsk. Agriculture seems to thrive, although the climate is so cool that at the end of July I found strawberries just ripening.

Issik Kul has been subject to changes of level. Two changes took place before the lake was tilted, and are recorded in two high terraces beside the outlet. It is possible that the terraces record a double rise and fall of the lake during two epochs of the Glacial Period, but no certain conclusion can be reached, because of the peculiar character of the lake's outlet. After the tilting the first position of the lake of which we have certain knowledge was about thirty feet higher than to-day, where the water stood long enough to form a well-defined beach and bluff. Along the flat shore of the western end, the thirty-foot beach is an insignificant line of sand, below which are smaller ridges of sand marking stages of retreat. Behind the ridges are lagoon-like strips of marsh. The present beach is a sand ridge of the same sort, often with a reedy lagoon behind it. Where the lake shore begins to be drowned the old beach is much more prominent. It appears like a railroad grade forming a flat-topped ridge across the mouths of valleys or a cut along the ends of spurs.

Mankind probably occupied the eastern shores of Issik Kul previous to the rise of the lake to the thirty-foot level. Fourteen miles east of the Russian village of Sazanovka, an artificial mound stands directly on the edge of the bluff which marks the old shore-line. The mound is of unknown age, and, like the other prehistoric mounds of the region, consists of granite cobblestones from five to twelve inches in diameter, piled in a circular wall and covered with loam. It is of small size, about a dozen feet high, and thirty feet in diameter. About a third of the mound on the lake side has been cut away, and the boulders lie scattered at the foot of the bluff. It is probable that the mound was built during or before the time when the lake stood at a high level, and was located so close to the shore that in course of time the waves undermined it. There is a possibility that it was built on the very edge of the bluff after the water had retired, and that it has since been worn away by ordinary erosion. This is unlikely, however, because of the smoothness with which the line of the bluff extends across the middle of the mound, and because of the lack of debris at the base of the latter. The lake could carry away the debris and preserve the smoothness of its shore-line, which would be impossible for ordinary erosion. A single case like this leads to no definite conclusion, but it suggests an interesting field of investigation in the relation of Issik Kul to early man.

Son Kul affords another suggestion of the way in which physiographic conditions may have varied since the advent of man. On

the mountain sides, at a height of from 10,000 to 10,500 feet above the sea, we found the remains of a number of large irrigation canals. They must be hundreds, possibly thousands, of years old, since they are thoroughly graded, and are sometimes wholly obliterated for a space. They cannot be of extreme age, however, for many can still be traced throughout their entire length, although they lie across slopes of considerable steepness, where erosion is so rapid that such small features must soon be eradicated. They must be irrigation canals, for they contour around the hills, are broad enough to carry most of the water of the streams from which they diverge, and come to an end in places suitable for fields. The peculiar feature is that they lie at a great altitude, where there is now no agriculture, nor could be, it would seem. Snow falls at Son Kul, so the people say, during all but two months of the year. On the morning of July 8, at the altitude of the upper canals, I walked on new snow which was said to have been a foot deep a few days before. Next morning, near the shore of Son Kul, below the level of the fields watered by the canals, the ground was stiff with frost, and the little pools on the edges of the brooks were skimmed with ice. Moreover, if agriculture was possible under such conditions, irrigation seems unnecessary. In July the ground was saturated with moisture, and the natives told us that the grass is always as green as when we saw it. The simplest hypothesis is that at some time since the human occupation of the country the climate was warmer, and therefore drier than now, but this cannot be proved. In regions such as Transcaspia and Persia, there is strong evidence of a greater water supply during antiquity. It is hard to reconcile the two sets of facts, but it may be that climate is more changeable than has been supposed, and that since the dawn of history man has passed through more than one change between colder and warmer, or moister and drier conditions. If this has been the case, the course of history must have been deeply affected by geographic causes as yet uninvestigated.

THE WESTERN SIERRA MADRE OF THE STATE OF CHIHUAHUA, MEXICO.

BY

EDMUND OTIS HOVEY.

The region comprised in Western Chihuahua, eastern Sonora, and southward in Mexico along the zone of mountains known as the Western Sierra Madre is practically a terra incognita to geologists and geographers. It includes the region left uncoloured on Costillo's geological map of Mexico as being unknown. Here and there mining engineers have examined bits of property for individual or corporate mine owners; but their reports rarely contain any structural data, and are seldom published in journals. The archæologist has penetrated into some of the mountain fastnesses, but he has given us scarcely a glimpse of the physiographic wonders of the region. No correct map of the mountains and rivers is in existence; but the railroad surveys now under way, in the effort to connect the high plateau with the Pacific coast region, should ere long furnish us with valuable data for one.

With the prospect, therefore, of traversing virgin territory, Professor Robert T. Hill and the writer* turned their faces toward the Southwest last winter, and spent several weeks in a remarkable series of cañons and mesas which will be described in a summary manner in the present communication, which gives some of the results of our joint observations. Our route led us southwestward across the Chihuahua desert province over the new Rio Grande, Sierra Madre and Pacific Railway to its present terminus at Nuevas Casas Grandes, Chihuahua, about 150 miles from El Paso, Texas, and from the very beginning the journey was suggestive.

The stratified beds of the arid and semi-arid regions of western America have given rise to much discussion as to their origin. Great lakes have been assumed to account for the extensive terraces, but it is difficult to conceive of the permanent or even protracted existence of large bodies of water under the conditions obtaining in the region. The cycle of the "mesa," or desert, formations was made clear by this little railroad journey across the arid bolsons to Lake Guzman and thence up the Casas Grandes, or

* The latter as the representative of the American Museum of Natural History.

San Miguel River. Under the influence of the great diurnal changes of temperature of the elevated plateau, and consequent expansion and contraction, the volcanic materials making up the mountains crack and disintegrate. The fragments as they descend the slopes become smaller, and soon come within the transporting power of the heavy winds which often prevail upon the plateaux.

The broken-down material is rapidly carried into the basins which lie between the numerous old centres of eruption and gradually fills them. From time to time the water collects in these depressions, and more or less temporary ponds are formed, which act like settling tanks—a term suggested by Professor Hill. Well-stratified beds thus originate within the wind-drifted areas and between beds showing little or no stratification. This explains the occurrence of some of the lenticular deposits of adobe clay in the strata composing the mesas. Robert T. Hill and others have written much upon the geology of desert and arid regions, but this explanation of the origin of some of the adobe clay deposits seems to have been overlooked.

The particular feature of the copious drainage of the high plateaux of the Western Sierra Madre is that most of the streams either dry up in the desert or flow into lakes which have no outlet. The Conchos, however (a tributary of the Rio Grande), is slowly working its way back toward the high plateau from the east; while the Yaqui and its branches, the Mayo and other Pacific rivers, are cutting into the plateau from the west with greater rapidity.

Lake Guzman, eighty miles from El Paso, is one of the largest of the desert lakes. It is 25 miles long and from 10 to 15 miles wide, and the evaporation from its surface is said to amount to seven feet per annum. The lake is reported to have been entirely dried up in August, 1904. The principal stream flowing into Lake Guzman is the Corralitos, or Casas Grandes River, and we followed this nearly to its source. Like other streams flowing into deserts, the maximum volume of this river is not near its mouth, but is near its entrance into the region where evaporation equals or exceeds precipitation.

The river which is known as the Corralitos for part of its course and the Casas Grandes for the rest is formed by the union of the San Miguel and Piedras-Verdes Rivers about ten miles south of the town of Casas Grandes, which received its name from neighbouring extensive prehistoric ruins. The San Miguel is the principal of these tributaries, and should give its name to the whole river, or

else the name Corralitos should be applied to the whole, the name Casas Grandes not being sufficiently distinctive on account of other regions of extensive ruins in Mexico. Many rivers in Mexico are known by different names in different parts of their courses—a practice which leads to much unnecessary confusion in geographic nomenclature.

Most of the mountains in sight from the railroad are volcanic in origin, but the Sabinal Mountains, about 100 miles from El Paso, are granitic in character, overlain by "porphyry" and by limestone of Cretaceous age. This is the location of the San Pedro group of silver and lead mines. Advancing southward from the end of the railroad as far as the Aros (Yaqui) River, 80 miles in an air-line, the rocks are almost exclusively volcanic, mostly rhyolite and andesite and their accompanying tuffs and dikes, together with comparatively local sandstones and conglomerates which have been derived directly from the volcanic materials and which represent ancient mesa and fresh-water basin formations. East of Hacienda San Diego blue limestone, probably of Cretaceous age, occurs in the foothills, and is quarried on a small scale for burning into lime.

About fourteen miles south of San Diego we began our ascent from the Chihuahua desert to the high plateau by way of the San Miguel cañon, and followed up its winding course for ten or twelve miles. The river is in a period of rejuvenation, and cuts a narrow, deep gorge 300 to 500 feet deep in a well-dissected plain which rises gradually to the cliffs forming the walls of the outer or upper cañon. The whole cañon is six or seven miles wide and about 1,800 feet deep. The principal rocks exposed are rhyolite flows and tuffs, but basalt occurs at the northern end of the cañon, and rounded andesite hills are under the rhyolite cap toward the south. The scenery is varied and beautiful.

Following the Arroyo Metate and another great ravine without a name, we climbed out of San Miguel cañon, and came upon the great plateau at 6,500 feet,* after passing over the outer rim of the cañon at 7,200 feet above the sea. The plateau is divided up into great haciendas or cattle-raising estates, the most valuable portions of which are immense nearly level plains or basins, most of which have no drainage outlet. The extensive plain, or prairie, known as the Llano Cristo forms a portion of the San Miguel hacienda, one of many belonging to General Luis Tarrazas, Governor of the

* All the elevations given in this article were determined by means of an aneroid barometer.

State of Chihuahua. The plateau is a constructional plain formed by the upper surface of rhyolite flows, with its hollows partly filled by the wash from the higher portions.

FIG. 1—YAQUI (AROS) CAÑON, NEAR GUAYNOPITA RIVER, IS 5,200 FEET LOWER THAN DISTANT RIM. INNER GORGE ABOUT 2,000 FEET DEEP.

The surface features of these plains would form an interesting topic for geographic study. Part of the Llano Cristo has been captured by the San Miguel (Casas Grandes) drainage; but much

of it is still independent, and none of the water falling upon this portion of the high plateau of Mexico reaches either ocean. The Llano Cristo contains some of the sources of the San Miguel River,

FIG. 2.—YAQUI (AROS) CAÑON AT GUAYNOPITA, 5,200 FEET DEEP. LOWER GORGE 1,800 FEET DEEP.

and is about 2,500 feet above the arid waste in which that stream loses itself.

Southward from Hacienda San Miguel our route lay along the

extensive prairies of the high mesa and across the spurs sent down from the mountain ranges, which traverse the plateau in a general north-south course. The mountains rise only from 1,500 to 2,500 feet above the mesa, and rarely is there a peak the altitude of which is more than 9,000 feet above the sea. All appear to be of volcanic origin, rhyolite and andesite lavas and tuffs predominating. The mesa itself gradually rises toward the south, and in the Llano Bavicora, a beautiful prairie 20 or 30 miles across, within the Hearst estate, is 7,000 to 7,100 feet in elevation. Moctezuma Pass (7,282 feet) is gained and crossed with scarcely a realization that the so-called "continental divide" has been traversed. The site of a large prehistoric village or city is indicated by the numerous mounds of the gently-rounding plain which forms the "Pass."

The inland drainage ceases here, and we are upon the edge of the Pacific drainage system, which is gradually "robbing" the plateau drainage. The newly-established lumber camp of Diedrick is in the mountains, just west of the summit of the plateau at Moctezuma Pass. Here the mountains rise abruptly to fully 9,000 feet above tide, and the trail to Guaynopita passes into the great cañon of the Yaqui River (here known as the Aros) at an elevation of 8,330 feet.

The view rivals that of the Grand Cañon of the Colorado. The Aros cañon is from 8 to 10 miles wide, and the river is from 4,500 to 5,000 feet below the highest points of the rim. From one point there may be seen nineteen flows of lava, one above another, with intervening beds of tuff and local conglomerate. The section here exposed gives additional support to the theory of mesa formation above expounded. Where the trail crosses the river (4,400 feet A. T.) there is a heavy bed of andesitic lava, showing the ropy character of the original surface of the flow. A thin bed of sandstone lies directly upon the lava, showing that this volcanic stream was covered with water soon after its extrusion.

Guaynopita, our next objective point, is a little mining camp hidden in the deep recesses of the Aros cañon, thirty miles by trail west of Diedrick. In reaching the camp we pass the ruins of an old arrastra, or mill, and the slag-pile from a neighbouring ancient furnace, where the Mexicans, generations ago, treated the copper, gold, and silver ores of the region. The romance and tragedy of mining have been carried through all these marvellous ravines, gorges, and cañons. At Guaynopita itself there is a splendid example of intrusive granite, associated with limestone. The limestone appears to be of late Cretaceous age; hence, the granite

is post-Cretaceous. Beautiful over-thrust faults are shown in the limestone, and in places metamorphism of the rock has gone so far as to produce schist. The ores (mostly chalcopyrite, cuprite,

FIG. 3.—YAQUI (AROS) RIVER AT GUAYNOPITA. SHOWS ABANDONED CHANNEL AT LEFT OF PRESENT COURSE.

and tetrahedite) occur disseminated through the granite and concentrated in quartz veins which traverse granite and limestone alike. The little district of Guaynopita is one of the most inter-

esting geological regions in existence, and several forms of ore deposits occur therein.

Leaving Guaynopita, our course lay somewhat east of south for four days along the high mesa, between the Aros River on the east and an important tributary, the Tutuaca, on the west. The mesa, or series of mesas, extending southward between these two rivers has a gentle dip toward the east and south; hence, the natural course of the streams of this region at first was toward the southeast, and the smaller streams still preserve this consequent course; but the master river, the Yaqui (Aros), and the Verde, the Tutuaca, and the Mulatos pursue an inverted course. The Chico alone of the great tributaries of the Yaqui (Aros) preserves its consequent course along the eastern slopes of the Candelaria Mountains. In several places the table-land is reduced to a narrow divide between the eastward and westward flowing drainage; but everywhere the western slopes are the steeper—the heads of the streams are being constantly pushed toward the east.

Twenty-five miles southeast of Guaynopita we encountered the old Temosachic-Dolores trail, and its well-worn mule-tracks looked like a highway across the Mesa Venado. For generations this was the route traversed by the hundreds of pack-trains needed for carrying supplies from Chihuahua to the mines of the Sierra Madre and for bringing back ore and bullion. Very recently a new route leading to the railway at Miñaca, with gentler grades, has been established farther south by American enterprise. Mesa Venado is several miles long and more than a mile wide; and lying as it does 7,400 feet above the sea, it supports a magnificent forest of the long-leafed sugar-pine. The timber of the high mesa is the real incentive for pushing forward the railroads, which are to make their way from the central plateau down to the Pacific Ocean.

Turning abruptly westward, we plunged from the Mesa Venado into a deep tributary arroyo of the Tutuaca, and made a complete cross-section of the Tutuaca cañon to Dolores. Rhyolite flows and ash-beds, and andesite flows and breccias, with an occasional bed of basaltic character, make up the foundation of the series out of which the gorges have been cut. Near the Tutuaca River there is a massive development of the conglomerate "mesa formation," corresponding to the La Brisca formation, which Hill has described from Sonora. These beds are hundreds of feet in thickness in places, but they appear to be local in development—the accumulation of "wash" in the basins of the original surface of the volcanic beds.

Where the trail crosses the Tutuaca the stream is about 125 feet wide and too deep for fording. The mining company at Dolores have built a primitive suspension bridge here for the convenient transfer of their freight. The water for the mill at the Dolores mine is pumped from the Tutuaca to a reservoir 1,700 feet above the river, which gives a head of 200 feet at the concentrator. The mine follows a siliceous vein carrying silver-bearing copper ore, which traverses a heavy bed of diabase. Several quartzose veins project like walls from the acid tuff beds of the region, and are the lodestone which attracted the ancients to the mineral deposits of Dolores and which has induced the modern miner to invest much money here.

Continuing southward from Dolores, we found the country more broken than it was on the east side of the Tutuaca; that is, the dissection of the mesas has continued farther and their tops are less extensive than farther east. At Yepachic, forty miles south of Dolores, we encountered the first agricultural Indian village we had seen since leaving Casas Grandes, a stretch of more than 125 miles in an air-line. The country is practically without permanent population, and it is only at rare intervals that one sees the ranch even of a squatter.

Our next objective point was Cerro Voludo, five miles southwest of Yepachic. The summit of this mountain (7,050 feet) is of densely-indurated rhyolite tuff, and is about at the altitude of the old mesa. Looking westward from Cerro Voludo, one gazes upon a wilderness of cañons and arroyos, with narrow ridges and sharp summits. The view is bounded by the profile of the edge of the great mesa between Trinidad and Mulatos. The topography is relatively old.

A few miles south of Cerro Voludo we leave the water-shed of the Yaqui River and descend 3,500 feet into the V-shaped cañon of the Rio de Mayo, here known as the Moris, which finds its way to the Pacific Ocean south of the mouth of the Yaqui.

In this cañon is to be found the best development that we saw of a dark blue conglomerate, apparently altogether of originally volcanic materials, which is older than the lighter-coloured, higher La Brisca formation. The dark blue conglomerate is massive, hundreds, if not thousands, of feet thick, is tilted at an angle of about 15° toward the southeast, and is separated from the later overlying beds by a long erosion interval, during which there was considerable deformation of the conglomerate. We propose to call this formation the Navosaigame. Water-worn fragments of bluish

limestone occurring loose in the river-gravel terraces of the cañon of the Mayo prove the existence farther upstream of marine beds, apparently of Cretaceous age.

FIG. 4.—CERRO VOLUDO. ALTITUDE, 7,050 FEET A. T.

The trail led out of the Mayo cañon over the Cumbre Potrero into the Arroyo Rosario, which is tributary to the cañon in which Ocampo is located. The region is one of decomposed tuffs and

lava beds lying unconformably upon the Navosaigame conglomerate, and the whole series is cut by dikes of all sizes. Ocampo is a celebrated mining camp, better known, perhaps, by its old name of Jesus Maria. From one mine alone, the Santa Juliana, $100,000,000 of silver bullion were taken by its Mexican owners during the last century, but the shaft and lower levels are now flooded. The cañon is so deep, narrow, and crooked that one does

FIG. 5.—CAÑON, RIO DE MAYO (MORIS), AT NAVOSAIGAME. 4,000 FEET DEEP.

not see the town resting in its bottom, 3,000 feet below the rim, until he is fairly on top of it.

The population of Ocampo varies greatly with the prosperity or adversity of the mines. It is said to be about 5,000 now; but it is hard to see where so many people can be stowed away, even in the Mexican fashion. The cabins cling close to the walls of the V-shaped cañon formed by the junction of the two arroyos to make the great cañon. The route out northeastward toward Pinos Altos and Miñaca leads up the eastern branch, "Arroyo San Juan," and 2,400 feet above the camp comes out on the great mesa in the

midst of a magnificent forest of giant spruces. At Pinos Altos (from which, by the way, all the "lofty pines" have long since found their way underground as mine timbers) there is a remarkable

FIG. 6.—OCAMPO (JESUS MARIA). GREAT SILVER CAMP.

series of great quartz veins, which have resisted atmospheric destruction much more successfully than the country rock, and stand out from the mountain sides like gigantic buttresses.

The journey to Miñaca lies over the high mesa at altitudes from 6,900 to 7,300 feet above the sea. The mesa is partly dissected by the headwaters of the Rio de Mayo, the Tutuaca, the Verde, and their tributaries, and north northwest-south southeast ridges rise from 1,000 to 2,000 feet above the general level. The highest points are said to be about 9,000 feet above tide. Extensive flows of basalt are associated with the beds of rhyolite, andesite, and tuffs. Beds of sandstone, apparently old mesa formations, dip toward the northeast at an angle of about 20°.

Miñaca, the present terminus of the Chihuahua and Pacific Railroad, has been established in a beautiful basin-like mesa 7,200 feet above tide, near the base of Miñaca Butte, a mountain of obsidian, which received its name from its having been the last stronghold of General Miñaca, one of the heroes of Mexican history. The railroad is pushing on to the southwest, while toward the northwest a branch track is done as far as Temosachic. From Miñaca to Chihuahua the road traverses a series of bolsons, crosses the "continental divide" at an elevation of about 7,600 feet, and plunges through several picturesque gorges in basaltic and andesitic lava on its way to the bolson (4,633 feet A. T.*) in which the city of Chihuahua is situated.

The route from Chihuahua to El Paso is familiar ground to every traveller in Mexico. One long, narrow bolson succeeds another with gradually lowering altitude until the edge of the mesa on the border of the Rio Grande Valley is reached, when the grades become steeper for the last few miles into Ciudad Juarez. The region is arid and semi-arid, and toward the north one encounters the "bufas" or frog-like monoclinal mountains, the médanos or shifting sand-dunes, and the lagunas, all of which are like the features seen along the Sierra Madre and Pacific Railway.

* Elevation of the railway station at Chihuahua Mexican Central Railway folder.

AMERICAN MUSEUM OF NATURAL HISTORY,
June 15, 1905.

ZUM KONTINENT DES EISIGEN SÜDENS.

VON

ERICH VON DRYGALSKI.

The importance of Antarctic exploration was first brought to Dr. von Drygalski's notice in 1883–84 by Freiherr von Richthofen. It was not until the later '90s, however, that the project of a German expedition was developed, largely through the efforts of Dr. Moritz Lindeman, Dr. L. Friederichsen, Professor G. von Neumayer, Karl Koldewey, Rear-Admiral Count von Baudissin, Dr. F. Schmidt, Minister Count von Posadowsky-Wehner, Dr. Th. Lewald, Professor Supan, and some others.

The keel of the *Gauss* was laid at the Howaldt works in Kiel in May, 1900, and she was practically finished in May, 1901. She was a three-masted schooner, with square sails on her foremast, and an auxiliary screw, and she was built principally of oak, teak, pine, and greenheart. She was 46 meters long, 10.70 meters broad, and had a speed of about seven knots.

The chief members of the expedition were Dr. Erich von Drygalski, Dr. Ernst Vanhöffen, zoologist and botanist; Dr. Emil Philippi, geologist and chemist; Dr. Friedrich Bidlingmaier, meteorologist; Dr. Hans Gazert, surgeon; Captain Hans Ruser, First Officer W. Lerche, Second Officers R. Vahsel and L. Ott, and Chief Engineer Albert Stehr.

It was decided to have a station for meteorologic and magnetic observations on Kerguelen Island in conjunction with the Antarctic expedition. Dr. Karl Luyken, Dr. Werth, and Dr. Joseph Enzensperger were chosen for this work, and went out on the S.S. *Tanglin*, taking with them the dogs for the *Gauss*. Dr. Enzensperger, unfortunately, died of beri-beri on Kerguelen Island on the 2d of February, 1903.

The *Gauss* started from Kiel Harbour on August 11th, 1901, and sailed *via* Madeira and the Cape Verde Islands to Cape Town, which was reached only on November 23d. The reason for this long passage was that much deep-sea fishing and many soundings and temperature measurements were done in the South Atlantic. The *Gauss* left Cape Town on December 7th, and proceeded, mostly under sail and sometimes under steam, to the Crozet Islands, which were reached on December 25th. These were found to be entirely

volcanic, and many sea-elephants were seen there. Thence the *Gauss* laid her course to Kerguelen Island, where she anchored in Royal Sound on January 2d, 1902. The auxiliary expedition of German scientists was met there, and the dogs were taken aboard.

The *Gauss* did not leave Kerguelen Island until January 31st. She reached Heard Island, which seems to be principally, if not entirely, volcanic, on February 3d. After a short stay, the *Gauss* sailed southeast, and began to meet icebergs in about 56° S. lat. on the 10th of February. In about 58° S. lat., soundings were taken which, for the first time, brought up stones of continental origin. The *Gauss* continued pushing south, with icebergs and pack-ice constantly on the increase. On the 14th of February she was on the edge of thick pack, and not being able to continue south, began to take a westerly course. At this point the *Gauss* was some distance north and west of Wilkes' extreme western point, near Termination Land. Four explorers—Cook, Wilkes, Nares, and Drygalski—have been round this spot,* and found the ice too solid to be penetrated, an almost certain proof that not far back there must be a supporting nucleus of solid land—" Termination Land "—under the ice. The *Gauss* now steamed west and southwest along the edge of the pack until on the 18th of February she was in 90° E. long. There the pack grew thinner, and she was able to make her way south and a little east, and on the 21st of February high land was seen northwest from the *Gauss*. This was in a direct line with the spot whence Wilkes saw " the appearances of land," which he charted as " Termination Land," and there can be no reasonable doubt that Dr. von Drygalski there saw the west coast of Termination Land.†

Later the same day, the *Gauss* reached a hitherto unsighted part of the coast of East Antarctica, west and a little south of Termination Land. This new land was christened " Kaiser Wilhelm II. Land." Its position is just south of the Antarctic Circle, between about 90° and 92° 30′ E. long. The edge was an ice wall 40 or 50 meters high, which sloped gently back to a height of some

---

* *Antarctica*, by Edwin Swift Balch, Philadelphia, 1902, pages 70, 156, 195.

† In his first paper about his expedition in the *Zeitschrift der Gesellschaft für Erdkunde zu Berlin*, 1904, No. 1, Dr. von Drygalski spoke positively of the non-existence of Termination Land. The writer called attention to this as being an error in the *National Geographic Magazine*, May, 1904, Vol. XV, p. 220–221, and argued that " Termination Land " and Dr. von Drygalski's " Hohes Land " must be identical. Dr. H. Wichmann shortly afterwards acknowledged, in *Petermanns Mitteilungen*, the accuracy of this criticism. In a note in *Zum Kontinent des Eisigen Südens*, page 233, Dr. von Drygalski gives it as his opinion only that his " Hohes Land " can scarcely be identical with Termination Land; but he adds that he did not give any name to the " Hohes Land " and that the name " Kaiser Wilhelm II. Land " only applies to the coast-line on both sides of the Gaussberg.

300 meters, beyond which nothing could be seen. A fearful storm with heavy snow now came on, and the *Gauss* was tossed hither and thither in considerable danger among the ice, until the morning of the 22d, when she came to a stop just beyond 66° S. lat., in about 89° 45′ E. long. Here she was frozen in and remained until the 8th of February, 1903.

Winter soon came on, and the usual routine of a polar wintering was gone through, except, perhaps, that an unusual amount of scientific observations was made. Magnetic, astronomical, and meteorological stations were set up on the ice, and observations were taken regularly. A balloon was rigged up and numerous captive ascents were made, the first in Antarctica. A height of 500 meters was attained, and on one occasion the temperature at that altitude was high enough for Dr. von Drygalski to work without gloves. Zoological specimens were secured, among them several varieties of fish—*Notothenia*, *Lycodes*, and *Gymnodraco*. *Lycodes* is also found in the Greenland seas, and is another example that there is some similarity between the two polar faunas. Ice, icebergs, and ice temperatures were studied by Dr. von Drygalski himself, and he observed and took photographs of many forms and varieties of ice. None of these seems ever to have been of the prismatic kind which was especially studied by the Rev. G. F. Browne, and which the writer himself has often seen underground in *glacières*.* Much reading was done during the winter, and Dr. von Drygalski speaks highly of the works of Ross, Wilkes, and D'Urville, and he recognizes how easily mistakes could be made in the "forties" in regard to distinguishing land-ice and sea-ice, since even to-day, with all the accumulated knowledge on the subject, it is not always easy to do so.

Beginning with the middle of March, numerous sledge parties were sent out. On one of these, on the 22d of April, a small mountain was discovered to the southwest of the ship. It was christened the Gaussberg, and was ascended several times during the course of the year. It was largely free from snow, and appears to be volcanic in formation. Nests of several species of sea-birds were found in the hollows of the lava.

The expedition came to the same conclusions about clothing that most others have—namely, that furs were only useful to sit down or to sleep in, and that woollen garments with an outside canvas wind-breaker were far better suited for active work. The usual lack of flavour was noticeable in the preserved foods; and it was observed that it was well to have preserves come from as many

---

* *Glacières or Freezing Caverns*, by Edwin Swift Balch, Philadelphia, 1900.

different firms as possible, as it was noticed, for instance, that the same kind of soup tablets from two different firms had a more distinctive flavour than two different kinds of soups from the same firm. This led to the curious result, probably unique in the annals of cookery, that the *menus* were made up by mentioning the names of the firms instead of the contents of the tins. Seals and penguins, of course, were largely the basis of the diet. Quantities of sugar were craved by the men. Dr. von Drygalski himself considered six lumps in a large cup of tea the right number, and Dr. Bidlingmaier thought ten lumps made each cup of tea or coffee hardly sweet enough. The importance of sugar in a polar diet has never been so forcibly noticed before.

Towards January, 1903, fearing the ice might not break up, Dr. von Drygalski began to prepare to meet a relief vessel by retreating to Knox Land. He says "a voyage to this from the winter quarters of the *Gauss* would have to take place along the vicinity of the coast," which shows that Dr. von Drygalski thinks the coast stretches from Kaiser Wilhelm II. Land to Knox Land, or, in other words, that he really believes in the existence of Termination Land.

In January and February, 1903, the ice near the *Gauss* was cut with saws and blown up with explosives; yet little was accomplished. But in the beginning of February the ice began to break up of itself, and on the 8th of February the *Gauss* was able to work her way back towards the ocean, or, rather, was floated along with the slowly-moving pack. The course was nearly due west until the 25th of February, when the *Gauss* was in 86° E. long. There she was able to work her way northward, and on the 16th of March she reached the open sea. Here a westerly direction was taken to about 80° E. long, where an attempt was made to push south along the course where the *Challenger* crossed the Antarctic Circle, but heavy pack prevented the *Gauss* from reaching the 66th parallel. In the beginning of April the *Gauss* once more steered back to the open sea, sailed past Kerguelen Island, and in the end of April stopped at St. Paul Island and New Amsterdam Island. Thence she returned *via* Natal, Cape Town, and the Atlantic Ocean to Germany, reaching the mouth of the Elbe on the 24th of November, 1903.

It seems a pity that so much time was spent on the down voyage in the Atlantic. Had the *Gauss* reached the coast of Termination Land in the beginning of January instead of the middle of February, it is possible that much more exploring might have been done before she was frozen in, and the outline of East Antarctica as far as Kemp Land might perhaps have been roughly sketched in. With this

exception the expedition was well handled, and it has made some important additions to our knowledge of the Antarctic. Dr. von Drygalski's book is well and conscientiously written, but it errs, perhaps, in being too long, and it sadly needs an index.

The Belgians, the English, the French, the Germans, the Scotch, and the Swedes have now recently sent out Antarctic expeditions, with great benefit to science. These efforts appear to have stopped. Yet much remains to be done. Would it not be possible for America to take the matter up in turn? It almost seems as if it were a national duty to send a steamer like the *Bear* to repeat at least the voyage of Wilkes from Cape Hudson to Termination Land, and to try to chart more definitely the coasts of which he could, in his old sailing vessels, at the best only get glimpses.

EDWIN SWIFT BALCH.

UNITED STATES GEOLOGICAL SURVEY PUBLICATIONS.

PROFESSIONAL PAPERS. No. 29. Forest Conditions in the Absaraka Division of the Yellowstone Forest Reserve, Montana, by John B. Leiberg. Contains the usual description of forest conditions, with land classification and map. In view of the sharp differences of opinion now expressed about glacial erosion, it is of some interest to find the author speaking of the Pleistocene glacier as sculpturing and fashioning the region into its present forms, cutting gorges thousands of feet deep. More than 30,000 acres in the Reservation are occupied by lakes of glacial origin, lying either in rock basins or behind masses of moraine.

No. 30. This also belongs to the Forestry series, is by the same author, and describes the Little Belt Mountains Forest Reserve and the Little Belt Mountains quadrangle, shows composition of the forest, gives distribution by regions and altitudes, and gives township descriptions.

No. 31. Preliminary Report on the Geology of the Arbuckle and Wichita Mountains in Indian Territory and Oklahoma, by Joseph A. Taff. Reported ore deposits of the Wichita Mountains are discussed by H. Foster Bain, the investigation leading to negative results and no encouragement to further prospecting.

BULLETINS. No. 234. Geographic Tables and Formulas, compiled by Samuel S. Gannett. Brings together matter needed in field and office by members of the Topographic Corps.

No. 236. The Porcupine Placer District, Alaska, by Charles W. Wright. This region is in southeastern Alaska, and its develop-

ment has awaited the settlement of the International Boundary. It is of moderate extent, but believed to be capable of profitable working. The production has risen from $1,000 in 1898 to $150,000 in 1903.

No. 240. Bibliography and Index of North American Geology, Paleontology, Petrology, and Mineralogy for the year 1903, by Fred Boughton Weeks.

No. 242. Geology of the Hudson Valley between the Hoosic and the Kinderhook, by T. Nelson Dale. Deals mainly with structural geology. In a brief reference to economic phases the author points out that rye, one of the chief products of Rensselaer County, has a special affinity for the soils made from the greenish Cambrian shale of the region, and will grow on what is almost a bare ledge of this rock.

No. 259. Report on Progress of Investigations of Mineral Resources of Alaska in 1904, by Alfred H. Brooks and others. This Bulletin illustrates in its early appearance the new policy of the Geological Survey to give the promptest possible publicity to facts of economic bearing. This gives information to prospectors and investors, and saves useless expenditure.

The value of the Survey work receives interesting confirmation in the prediction of high-level placer beds at Nome. The field work of 1899 showed the fact of general uplift, and on the basis of this fact the geologist inferred that elevated beaches and high benches bearing gold might be found. Millions of dollars have been taken from such deposits, later found.

The report contains a folding sketch map showing the chief localities of the various minerals of the Territory. Nine parties were sent into the field during the year 1904, the field season being, of course, very short.

Much of the report is given to placer mining. Ignorance of the special conditions has led to much wasteful expenditure, as in setting up plants where water supply was poor or installing steam shovels without taking account of the frozen ground. The Alaskan season is short, transportation and labour are expensive, and it is no place for a hit-or-miss policy.

Underground alluvial mining is increasing on the Seward Peninsula. This makes continuous work possible, and the product of the winter of 1903–4 was more than $1,000,000. Drifting is used in gravels ranging in thickness from 40 to 150 feet. Wages are stated as 50 per cent. less in winter than in summer.

A genuine bonanza in placer gravels was found in October,

1904. It was said that it yielded, worked with a rocker, 200 pounds of gold in seven hours. Rival claimants were active, and served four injunctions on the owner within twenty-four hours. The summer of 1904 was poor in results, as water was scarce. The snows of the previous winter and the rains of early summer were light.

Attention is given to the further development of tin in this region. Work has now begun in lode-mining, the early finds being of stream tin. An ore body of about 60 x 15 feet has been found on Cassiterite Creek. Twelve tons of ore shipped to Seattle carried ten to twenty per cent. of metallic tin.

No. 264. Record of Deep Well Drilling for 1904, by M. L. Fuller and others. It is proposed to publish annually the results of investigations in this field, the co-operation of drillers and contractors being sought. The present report gives the record of wells from which samples have been received by the Survey.

Water Supply and Irrigation Papers.—No. 109. Hydrography of the Susquehanna River Drainage Basin, by John C. Hoyt and Robert H. Anderson. In addition to the economic bearing of such papers, which is no doubt their main object, they should be useful to teachers of geography within the basins described, particularly at many points where the flow has been measured and the figures would furnish basis of interest and of discussion in the classroom. Thus such large local centres as Binghamton, N. Y., and Wilkesbarre, Williamsport, and Harrisburg, Pa., are included. The sketch map on page 11 isolates this system by showing the surrounding territory in plain white. Another Bulletin (108) will deal with the quality of water and the physiographic features of the same basin.

No. 115. River Surveys and Profiles made during 1903. Arranged by W. Carvel Hall and John C. Hoyt. Southern Appalachian localities chiefly occupy the report, and facts are given for which, as stated, there is much demand by engineers and others interested in developing power. Studies of the Chippewa River, Wisconsin, fill the closing pages.

Monograph.—No. XLVII. A Treatise on Metamorphism, by C. R. Van Hise. This is a bulky volume, mainly devoted to technical questions of geology. As, however, it treats metamorphism broadly, it touches some questions of interest in physical geography. Such are, the circulation of ground water, the belt of weathering, the work of plants and annuals, and the rate of weathering.

A. P. B.

GEOGRAPHICAL RECORD.

AFRICA.

Dr. Uhlig's Explorations among High African Mountains.—The ascent of the Kibo summit of Mount Kilimanjaro in the summer of 1903 by three members of the East Africa expedition, led by Prof. Dr. C. Uhlig, was briefly described in the Bulletin of 1904 (pp. 754–5). Dr. Uhlig has written for the *Zeitschrift* of the Berlin Geographical Society (Nos. 9 and 10, 1904) two articles entitled "Vom Kilimandscharo zum Meru," which form a preliminary account of the scientific work of this expedition. He reached a height of 19,500 feet on Kibo, the higher of the two summit peaks of Kilimanjaro, but the culminating point of Kibo, the top of Kaiser Wilhelm Peak, was still 200 feet above him. In addition to the facts mentioned in our earlier account of this ascent, Dr. Uhlig gives interesting details concerning the snow and glacier formations, illustrated by excellent photographs.

One feature is the occurrence on the surface of the slopes of long lines of strangely-shaped snow figures, several feet in height, considerably taller than those observed in the snow fields of the Andes, and which have been called "nieves penitentes," from the similarity they bear, when seen at a distance, to processions of white-robed penitents. The explorer says that those he saw on Kilimanjaro looked more like rabbits, dogs, and snow-men built by children than penitents. He attributes their formation to the ablation from insolation and the dryness of the air, though this does not explain "their regularity of arrangement, as they appear in two distinct lines, one up and down the slope and the other at right angles to the slope," or, in other words, along the contour lines. It is suggested (*Amer. Jour. of Sci.*, July, 1905) that this arrangement may be due to the cracking of the hardened snow in this regular manner, and that this, combined with the agencies he mentions, may explain the phenomenon.

On a second ascent of Kibo from the south, he discovered a new glacier, to which he gave the name of Richter Glacier.

The explorer then turned his attention to Meru, a great volcano to the west of Kilimanjaro, of which little has been known:

> Its height is about 15,200 feet. Uhlig's first ascent was made from upper Aruscha, on the south flank, at an elevation of about 4,500 feet. At 7,000 feet a girdle composed of dense masses of bamboos was met, which lasted to about 8,800 feet, and which required the greatest efforts to penetrate. It appears quite similar to the bamboo zone which Gregory encountered on Mt. Kenia, and which he found so difficult to surmount. Above this the mountain offered no special difficulties aside from the extraordinary steepness of its slopes. Towards its upper limit the flora assumes the distinctly alpine character noted on the other great volcanoes of equatorial Africa. Some forms of vegetation, grasses, compositæ, and *Arabis albida* persist even to the top.
>
> No snow was found on Meru, its summit falling over 2,000 feet short of the snow-line on the neighbouring Kilimandjaro. Nor were any marks of a former period of glaciation visible, although on Kilimandjaro, according to Meyer, the glaciation once extended some 3,000 feet lower than at present, and Gregory found evidences of much more extended glaciation on Kenia than it now shows. It is possible, however, that Meru may have had small hanging glaciers.

At the summit Uhlig found himself on the edge of a vast crater whose precipitous walls fell beneath him over 4,000 feet to the bottom. The highest point on the opposite wall he attempted in a second ascent from the northeast, but was unable to attain.

The mountain is a concentric crater, which shows several periods of volcanic

activity. The completion of the Uganda Railroad and the continued, though slow, advance of the German railroad inland from Tanga, making wide areas easily accessible, are likely to stimulate detailed studies of other parts of eastern equatorial Africa, such as Uhlig has been making in the region of Kilimanjaro.

GEOGRAPHY AT THE BRITISH ASSOCIATION MEETING.—*Nature* (July 6) announced the completed arrangements for the South African meeting of the British Association. The number of members to attend the meeting was 385, of whom no less than 276 had announced their intention to visit the Victoria Falls after the ordinary work of the association. The lectures of a popular character to be delivered before citizens of the various towns where meetings were held included these geographical topics:

At Durban, "The Highest Himalaya," by Douglas W. Freshfield; at Bulawayo, "Zimbabwe," by Mr. Randall-MacIver.

The programme arranged for Section E (Geography) was as follows:

Cape Town.—President's address: "Afforestation of South Africa;" "The Ordnance Survey of the United Kingdom," by Col. Johnston; "The Unveiling of the Coasts of Africa" (lantern views of old maps), by H. Yule Oldham; "A Comparison of the Periodicity of the Meteorological Conditions of London and Cape Town," by Dr. H. R. Mill; "Gough Island," by Rudmose Brown; "Terrestrial Globes as a Necessary Adjunct to the Teaching of Geography," by Capt. Creak; "Excursions as a Means of Teaching Geography" (lantern), by J. Lomas.

Johannesburg.—"The Evolution of Africa," by Dr. J. Scott Keltie; "A New Rainfall Map of Africa," by A. J. Herbertson and P. C. Waite; "Boundaries and Areas in Africa," by J. Bolton; "The Physical Geography of the Transvaal," by Tudor Trevor; "Notes on the Geography of Africa South of the Limpopo," by F. S. Watermeyer; "The Game Preserves of the Transvaal," by Major Stevenson Hamilton; "The Sikkim Himalayas and Tibet," by Mr. Freshfield; an Asiatic subject by Prof. Cordier.

THE SUDAN ALMANAC FOR 1905.—This little annual, printed for residents in the Anglo-Egyptian Sudan, naturally contains much information not found in our own works of reference. The edition for 1905, for example, tells the people that they need not be afraid of desert water, even though it may be muddy, for all water of the desert is wholesome. If they find it brackish, however, they must not drink too much of it. If they meet water which tastes so badly that they cannot drink it, they may find some relief from thirst by immersing their arms in the water and keeping them there for some minutes. It is a good practice to sink in a muddy well a large tin or biscuit box perforated with small holes and covered on the outside with cotton cloth, the top of the box remaining above the surface of the water. The cloth will act as a strainer and the water in the box will be comparatively free from mud. Travellers carrying water with them are informed that a gallon of water weighs ten pounds, and a cubic foot of it sixty-two pounds. The minimum drinking water allowance for a man should be one and one-half gallons a day. A camel drinks from 12 to 18 gallons at a time, and should, if possible, be watered every other day. A horse drinks 6 gallons a day, one and one-half gallons at a time. For a long camel ride the waist and lower chest should be swathed fairly tight, with cloth bands to give support. To avert fever, mosquitoes should be avoided, and therefore camps should not be made near stagnant water.

AMERICA.

RETREAT OF THE ALASKAN GLACIERS.—Prof. George Davidson, who has carefully studied all the old charts and narratives relating to the glaciers along the coast of Alaska, has written a paper, "The Glaciers of Alaska that are Shown on Russian Charts or Mentioned in Older Narratives" (*Trans. and Proc. of the Geog. Soc. of*

the Pacific, Vol. 3, Series 2). He presents, with the paper, copies of a number of the early charts, with the outlines of the latest maps, showing in this manner the changes that have occurred in the position of the ends of some of the glaciers. As nearly as he can determine there has been a general recession of the glaciers through the Aleutian Islands, the Peninsula of Alaska, and from Cook Inlet to Portland Channel, except where they come directly, or almost so, upon the broad ocean. The evidence of advance seems clear at Wimbleton or Taylor Bay, just inside Cape Spencer, at Icy Strait, since the survey of Whidbey; but the recent topographical survey by the U. S. Coast and Geodetic Survey shows a retreat behind the terminal moraine which it has left as a record.

The Malaspina Glacier has filled and obliterated the Icy Bay of Vancouver and Tebenkof. The recent Canadian Survey indicates that the glaciers of Lituya Bay have shortened the deep arms described by La Pérouse; and the La Pérouse Glacier, upon the ocean shore, shows positive signs of advance, according to the reports of the Harriman Expedition of 1899. In this region of advance, however, the immense ice blockade at the head of Yakutat Bay, so well depicted by Malaspina and confirmed by Tebenkof, has been carried away, and the Turner and Hubbard glaciers now discharge into the sharp bend of the fiord at the head of the bay. It is gratifying to note that wherever the recent surveyors have located a glacier front, they have given good bases for comparison with future surveys of similar character.

Maryland and Johns Hopkins University.—The State of Maryland continues to illustrate the advantages of associating the scientific staff of a great university with the work of carrying out public utilities of a scientific character. Since their organization the Maryland Geological and Economic Survey and the Maryland State Weather Service have both been in charge of Prof. William Bullock Clark, who occupies the Chair of Geology in the University. The State annually appropriates the sum of $27,000 for the support of these two bureaux. An important number of Prof. Clark's assistants in these public services are members of the Faculty at Johns Hopkins. All the volumes of the "Maryland Geological Survey," from the first in 1897, together with the series of exhaustive reports on the resources of various counties, the volumes dealing with the systematic geology and paleontology of the State, and the various reports on the Physiography of Maryland and the State Weather Service, are permeated with the scientific spirit of the University staff, and to a considerable extent are the results of field work carried out by members of the Faculty. By a recent act of the Legislature the Geological Survey has also received control of the construction of the State highways, involving an annual expenditure of $400,000.

The Northern Maidu.—These Indians of California, more commonly known as "Diggers," though that meaningless name is also applied to other Indians in that State, live in the northeastern portion, roughly speaking, between the Sacramento River and Nevada. Their language is distinct from that of other tribes, and they therefore constitute a stock by themselves, but they lack, like many other aborigines of the Pacific slope, any collective name as a group. Stephen Powers called them "Maidu," a word in their language meaning "Indian" or "Man." The study of these people was a part of the work of the Huntington Expedition in 1899, 1900, 1902, and 1903, and Mr. Roland B. Dixon has prepared a paper embodying the results of the investigation of the Northern Maidu, which appears in the *Bulletin* of the American Museum of Natural History (Vol. 17, Part 3, pp. 119–346), in which their history, material culture, social organization, customs, religion, etc., are described.

It is noteworthy that the Maidu, like most of the other stocks of California, have not been migratory on any large scale. It is in this respect that the Californian peoples differ greatly from the tribes and stocks of the eastern and central parts of the continent, which have been migratory on a large scale, and show over great areas a considerable uniformity of culture, while the California peoples show greater stability; and the culture of each tribe or stock being shaped in accordance with its own continuous environment, a greater variety of culture is apparent in California than in the East.

Many woodcuts illustrate the meagre arts of the Maidu, and a number of photographs show their huts, dance-houses, etc. No tribe can be wholly typical in a region of so much diversity as California, but Mr. Dixon says that in the simplicity of their culture, small development of the arts, dependence on roots, acorns, seeds, fruits, and game for food, rudimentary social organization and general character of their ceremonial life, the Maidu represent as well as any other stock the aboriginal culture of that part of the State.

PROPOSED EXPLORATION OF THE EAST COAST OF GREENLAND.—Since Peary rounded the most northern point of Greenland and mapped the north coast the only shore of the island that remains entirely unknown is the region between Cape Bismarck, in about 76° 40′ N. Lat., and Independence Bay, discovered by Peary. This unexplored stretch of the east coast extends for a distance of about 400 miles. Mr. L. Mylius Erichsen of Copenhagen, who was the leader of the so-called Danish Literary Expedition to Greenland which returned to Europe last year (BULLETIN, 1904, pp. 363–4), has declared his willingness to undertake the important task of exploring this part of the coast, and thus completing our knowledge of the periphery of the island. He is now endeavouring to raise funds for his expedition. Sir Clements R. Markham, in his address to the Royal Geographical Society in May (*Geog. Jour.*, July, 1905), emphasized the importance of making this exploration:

> It is, in some respects, a region of special interest. Here, if anywhere, a knowledge may be obtained of the very interesting migrations of Eskimo and large mammals from east to west. Clavering, in 1822, found 12 Eskimo on the coast between 74° and 75° N. But none has ever been seen since to the north of the settlement of Angmagsillek. Knowledge is also needed of the northern migrations of the musk-ox, reindeer, wolf, and fox. The numerous deep fiords should be explored, and the labours of the German expedition, of Nathorst, and of Amdrup require to be connected and completed.

Mr. Erichsen has already demonstrated his capacity, and the task he proposes would be in good hands under his leadership. He lived among the Smith Sound Eskimo for ten months, sledged across the island of Disco, visited the inland ice in two places, and knows most of the western coast of Greenland. His party sledged northward along the west coast from Jakobshavn in the south to Saunders Island in the north, and this was the first time that a sledge expedition skirted the entire coast of Melville Bay.

UNDERGROUND WATER RESOURCES OF THE GREAT PLAINS.—Mr. N. H. Darton, of the U. S. Geological Survey, has written a volume of 433 pp., entitled "Preliminary Report on the Geology and Underground Water Resources of the Central Great Plains" (U. S. Geol. Survey, Prof. Pap. 32). The geological features of the area discussed (most of South Dakota, Nebraska and Kansas, and westward to Central Wyoming and Colorado) are fully presented in the first half of the quarto; but the chief interest of the investigation lies in the question of water supply, which is very inadequate in a large part of this territory, and must be supplemented where possible by artesian wells, many of which have been sunk with excellent results.

It is believed that the rocks of Cambrian, Ordovician, Carboniferous, and Jurassic

age underlie this entire area; but very few wells are found lower than the Cretaceous, and the water horizon of the Dakota sandstone is the most widely extended and most useful in the Great Plains. The sandstones outcrop extensively along the uplifts of the Black Hills, the Big Horn, and the Rocky Mountain front ranges, and in the Arkansas valley in Southern Colorado, where they receive large volumes of water, both from the rainfall and the sinking of water from streams.

The most important prospects of water from the Dakota sandstone, as yet undeveloped, are in the central and western parts of South Dakota, and in the region north of the Black Hills. In this formation, the author says, over 1,000 deep wells have been sunk east of the Missouri River, most of which are from 500 to 1,000 feet deep, and generally yield a large supply of flowing water, which is used for irrigation. The aggregate flow from these wells is about 7,000,000 gallons a day. There is as yet no valid evidence that the supply is diminishing, except in places where there are numerous wells. The supply from the Fox-Hills formation is much more limited. Useful wells are also developed in the Tertiary, particularly in the Denver basin. Large quantities of water from limited depths (5 to 50 feet) are also obtained from the alluvial deposits of the Quaternary, and the tubular wells in east South Dakota and east Nebraska yield the water of the glacial drift mainly at the base of the till.

The fact that the water is under great pressure shows that its altitude, where it originates, must be some thousands of feet above the point of delivery. Some wells in eastern South Dakota, for example, show surface pressures of over 175 pounds to the square inch, and two are over 200 pounds; in the latter case a pressure of 780 pounds at the bottom of the well is indicated. The volume gives full details concerning existing wells, and closes with a discussion of the economic geology of the region, such as the supplies of coal, petroleum, salt, gypsum, gas, etc. There are many fine views from photographs, and also geological maps and sections.

THE CONVENTIONS OF WEATHER BUREAU OFFICIALS.—In the mind of the general public the work of the Weather Bureau is usually associated only with the publication of daily weather maps and forecasts. There are, however, many activities in which the officials of the Bureau are engaged which are of a less public and consequently less well-known character, but which nevertheless deserve a wider recognition. Among these may be noted the several conventions of the officials of the Bureau. These gatherings are the means of bringing together, in a social way, many members of the Weather Service who would otherwise seldom or never meet, and thus of promoting an *esprit de corps* which tends to consolidate and to harmonize the various activities of the Bureau. But of more importance than the encouragement of the feeling of good fellowship and of co-operation is the opportunity for hearing and discussing papers on a very wide range of subjects of general interest in national weather service work. The papers which are presented at these conventions are, as a whole, marked by a direct, forceful, practical treatment of the matters which they deal; they furnish topics the discussion of which cannot fail to be of value to all those present, and in the printed reports of the proceedings of the conventions they are brought before the larger audience of the voluntary observers of the Bureau and of meteorologists in general the world over. The scope of these gatherings has gradually been enlarging since the first meeting was held in 1892, and their scientific value has steadily increased. In future years, as later meetings are held in different parts of the country, the good results which come from such conferences will be more generally appreciated and will attract more attention.

The first convention under the auspices of the National Weather Service was held at the Smithsonian Institution, in Washington, on February 24 and 25, 1886.

There were among the members of that convention the head of the Signal Service, Gen. W. B. Hazen; Messrs. Abbe, Ferrel, Mendenhall, Davis, Rotch, Upton, and representatives of State weather service organizations from Alabama, Indiana, Minnesota, New York, and Ohio. In 1892 there was organized the American Association of State Weather Services, which held its first meeting at Rochester, N. Y., August 15 and 16, 1892. The report of this meeting was published as Weather Bureau Bulletin No. 7, 1893. The second meeting was held in Chicago, August 21 to 25, 1893, in conjunction with the larger Congress under the auspices of the World's Fair, and the papers were published in Bulletin No. 11 of the Weather Bureau. The third meeting was at Brooklyn, N. Y., August 17, 1894, in conjunction with the American Association for the Advancement of Science. Bulletin No. 14 of the Weather Bureau contains a report of the proceedings. The fourth and last meeting of the American Association of State Weather Services was held at Indianapolis, Ind., October 16 and 17, 1895 (see Bulletin No. 18). This Association had from the start been nominally an affiliated society of the American Association for the Advancement of Science, but only two of the meetings of the former were in conjunction with those of the latter—viz., those at Rochester, in 1892, and at Brooklyn, in 1894. It was found that the meeting-places of the American Association for the Advancement of Science were often inconvenient for the Weather Bureau officials.

When Prof. Willis L. Moore became Chief of the Bureau the plan of these conventions was altered. It was decided that the membership should be composed of officials representing without restriction all lines of work conducted by the Weather Bureau, and that the conventions should be held once in three years instead of annually. The first convention of Weather Bureau Officials, under the new plan, was held in Omaha, Neb., October 13 and 14, 1898, the change in the membership of the gathering being evidenced by a change in the kind and number of the subjects discussed. In former years the discussions dealt with the climate and crop side of the Weather Bureau Work. The deliberations of the convention of 1898 covered practically the entire range of the Weather Bureau Work (Bulletin No. 24). In 1901 the Convention was held in Milwaukee, Wis., on August 27 to 29 (Bulletin No. 31), and in 1904 at Peoria, Ill., on September 20 to 22. The Proceedings of the Third Convention of Weather Bureau Officials, recently published by the Weather Bureau, in an octavo report of 267 pages, show that a wide range of subjects, of great national interest and importance, was ably presented and discussed at this latest meeting.

R. DEC. W.

THE VARIATION OF RAINFALL IN THE ARID REGION OF THE UNITED STATES.—More attention than ever before is being paid to questions of rainfall and of irrigation in the arid portions of the United States. The Weather Bureau, with its large collections of rainfall data, is constantly endeavouring to put before the public all the latest information which is available concerning the conditions of precipitation in those large sections of the country which are usually classed as arid. The latest publication in this connection is Bulletin *N*, entitled *Periodic Variation of Rainfall in the Arid Region*, by William B. Stockman, Chief of the Division of Meteorological Records of the Weather Bureau. This paper was read before the Twelfth National Irrigation Congress, which met at El Paso, Texas, November 16 to 18, 1904, and deals with rainfall at selected stations which lie between the 96th meridian and the central portions of Washington, Oregon, and California. Those stations were selected which show best the average conditions that have prevailed generally over the State or region in question, due consideration being given to the length and the continuity of the record and the altitude of the station. A large chart contains dia-

grams for eighty-four stations in the arid and sub-arid regions, showing graphically the average precipitation for each month. No isohyetal lines are drawn to show annual or monthly amounts of rainfall, but instead the data are given in tabular form. Table I shows the excess or deficiency of the annual average for the pentads (five years) as compared with the average annual precipitation for the entire period of observation. Table II shows the average monthly and annual precipitation at selected representative stations in the arid region. During the several pentads from 1869 to 1903, inclusive, the numbers of stations noted in the following table showed an excess or deficiency as compared with the entire period:

PENTAD.	STATIONS. PLUS	MINUS
1869–1873	5	9
1874–1878	16	13
1879–1883	16	22
1884–1888	27	15
1889–1893	26	21
1894–1898	16	33
1899–1903	13	37
Total	119	150

It appears, therefore, that 119 stations showed an excess and 150 showed a deficiency. When the amounts of the excesses and deficiencies at the various stations are summarized a total deficiency of 26.02 inches is found for the whole period and the whole number of stations.

While this *Bulletin* cannot be considered very satisfactory, in view of the great differences in the length of the records and of the fact that they are not all reduced to the same period of time, it does present facts which are of interest to a large number of persons who have to do with our arid and sub-arid districts. R. DeC. W.

Opportunities for Investigation in the Olympic Peninsula.—This peninsula occupies the extreme northwest corner of the United States, and, as all maps show, is almost cut off by water on every side. The irregular group of the Olympic Mountain ranges that radiate on all sides from Mount Olympus (8,150 feet) occupies most of the peninsula. The Olympic Forest Reserve, set apart in 1897, also includes most of the peninsula, which cannot now be said to be almost wholly unknown, as was the case ten years ago, for the Reserve has been traversed and studied, at least as far as its forest conditions are concerned, by the Geological Survey. The work of examination was carried on during the seasons of 1898, 1899, and 1900 by Messrs. Arthur Dodwell and Theodore F. Rixon, whose report was published in the 21st Annual Report of the U. S. Geol. Sur., Part V, and in 1902, somewhat expanded, as Professional Paper No. 7.

Numerous glaciers and snow fields were found in the central parts of the mountains and many rivers heading in the central mass and radiating outward in all directions.

This report does not deal, however, with the geology or some other important aspects of the peninsula. The following timely statements are condensed from an article by Mr. Henry S. Conard (*Science*, No. 532), who says that here is almost virgin soil for nearly all kinds of scientific investigation. He refers to the above-named paper, with its maps and illustrations, as the best account yet available concerning this region:

. . . . The vegetation of the Olympic Peninsula is truly remarkable. Below 5,000 feet is the great northwestern forest, which must be seen to be appreciated. Douglas fir, tideland spruce and "red

cedar" (*Thuja plicata*) reach gigantic proportions. . . . What with fallen timber and undergrowth of ferns and shrubs the forest is a veritable jungle. By hard work one can travel a quarter of a mile an hour off the trails! . . . .

The matted tree tops admit only a gloomy light below, and the darkness is deepened by great blankets of *Selaginella* (*S. oregana*) and bearded lichen (*Usnea*) depending from the branches. A thick bed of moss covers all the ground and swathes the bases of the tree trunks. Above 2,000 feet, however, the forest is quite open, but travel is impeded much more seriously by the impassably sharp hogbacks and steep canyon walls. The mountains slope more gently southward than on other sides, and it is believed that Mt. Olympus could be reached from the valley of the Quiniault River. . . .

The fauna is equal to the flora in richness. Black bears, panthers, wild cats and wolves are numerous. A few squirrels and the mountain beaver are found. Deer and elk are plentiful. The garter snake is the only reptile. Wild duck and pheasants are occasional, and the familiar robin is seen about the houses. Salmon and trout of several kinds abound in all streams that are large enough. Quiniault salmon is said to be the finest on the coast. The report of the expedition from the Field Columbian Museum on the mammals of the Olympic Peninsula is the only record of its fauna.

In each river valley a distinct tribe of Indians originally made its home. The Makah at Cape Flattery were studied by Swan, and are an extremely interesting group. The Quillayutes and Quiniaults would equally repay an immediate investigation; but their old habits are rapidly vanishing before the Government schools. Whites began to settle the Quiniault Valley in 1892, but the movement is very slow on account of the difficulty of clearing land and of getting produce in and out. It is estimated to cost $200 an acre to remove the timber enough for farming operations.

Persons speak of the Olympics as volcanic, but we saw no sign of volcanism either in the rocks or in the pebbles of the Quiniault or Queets rivers. Along the coast a soft, green, marly, Cretaceous sandstone lies in gentle folds, each crest jutting out to sea as a steep headland 150 to 500 feet high. Rivers occupy the synclines. In the sandstone many fossils are found. Especially noticeable were stumps, logs and fragments of wood at different levels and in various stages of transition to lignite. Capping this stratum is a layer of recent yellow gravel, varying from ten to forty feet in thickness, and also enclosing logs and stumps. . . .

METEOROLOGICAL INSTRUCTION IN THE UNITED STATES.—Within the last few years several efforts have been made to obtain accurate information regarding the exact conditions of meteorological instruction in the schools and colleges of the United States. The investigation is one well worth undertaking, because the subject of meteorology is one of great and growing importance, and because the status of meteorological instruction is uncertain and, on the whole, discouraging. The unsatisfactory conditions may be explained in various ways: the feeling that meteorology is not worthy of a recognized place in school or university curriculum; the lack of capable teachers; the failure of school authorities to allot the necessary time for the work; the fact that there is no career open to any considerable number of trained meteorologists, and so on. Doubtless these, and many other reasons, have operated to keep meteorology out of the place which it is slowly winning for itself; for that it is gaining ground year by year is clear to any one who looks over the field of common-school and of college education year after year. There is no question that students of geology, botany, zoology, medicine, and engineering, to mention no other subjects, would all be much helped by a fairly systematic training in the elements of meteorology, and, were such instruction required of them, the teaching of meteorology would at once be extended and improved throughout the country, both in schools and in colleges. This would mean a greater demand for teachers of meteorology. That there is opportunity for persons skilled in meteorology and climatology to make themselves useful and valuable in many different lines of business activity there is no question. But more and more emphasis should be laid on the practical application of the facts which the students acquire, in climatology especially, where the importance of the climatic control over the occupations and activities, as well as over the health of man, has received far too little emphasis.

About a year ago, by direction of the Secretary of Agriculture, a circular letter was sent to all persons who were believed to be engaged, or interested, in the teach-

ing of meteorology in schools and colleges in the United States. The object of the inquiry was to obtain information regarding the number and character of the courses of instruction that are now being given; the demand for such courses; the didactic value of meteorology as a course of mental training, and the commercial or pecuniary value of meteorology as a professional career. The replies to this circular, which have been printed by the Weather Bureau, may be briefly summarized as follows: At several of the universities and colleges courses in elementary meteorology are given, usually by instructors whose main business is along other lines of work. In some cases such courses have been given and then discontinued. Weather Bureau officials in many places are doing their best, in a most praiseworthy manner, to stimulate interest in the study. Scattering schools, here and there, where the teachers of physiography or of some other branch of science have a special interest in meteorology, pay some attention to systematic work in the subject. But there is a very evident lack of proper, systematic, thorough, well-co-ordinated instruction in meteorology in the country as a whole, from schools to universities. There is but one university where meteorology may be taken as a subject for admission, and that same university is the only one in the country which deems meteorology and climatology of sufficient importance for one professor to give his whole time to teaching the subjects.

R. DeC. W.

Report of the Superintendent of the Coast and Geodetic Survey, 1904.—This report gives the progress of work from July 1, 1903, to June 30, 1904.

Mr. O. H. Tittmann, Superintendent, reports the completion of determination of difference of longitude between San Francisco and Manila. This work also determined the longitude of Honolulu and Guam. The new Alaskan boundary was taken up subsequent to the decisions of the Boundary Tribunal, and magnetic determinations have been made at 367 stations.

Field work was accomplished for revision of two volumes of the Coast Pilot, covering the coast from Point Judith, R. I., to the entrance of the Chesapeake Bay. The charting of the imperfectly-known waters of the Philippine Archipelago was carried on during the year.

The comprehensiveness of the Survey's work appears in the fact that one member served on the Mississippi River Commission; work was completed on Mason and Dixon's Line between Maryland and Pennsylvania; work was done on the oyster beds of Louisiana; the Superintendent aided in presenting the American Case to the Alaskan Tribunal; and the vessels of the Survey several times responded to calls to patrol racing regattas. The total appropriation for the year was nearly one million dollars. In the necrology for the year is found the name of a well-known member of the force—Mr. Adolph Lindenkohl. The record of field operations in detail fills most of the volume.

A. P. B.

Field Operations of the Bureau of Soils, 1903, by Milton Whitney, Chief.—With many accompanying papers, and an extended series of maps in case. This large volume of over 1,300 pages, with the maps, constitutes the fifth report of this Bureau. The following facts are taken from Mr. Whitney's brief preliminary report. Representatives of the Bureau have organized soil-survey work in the Philippine Islands. Forty-five men are in the actual work of soil-survey, nearly all of such experience as to be in charge of parties. Work has been carried on for the whole year by assignment to southern areas during the winter. Nearly thirty-five thousand square miles had been surveyed before 1903, and more than twenty-six thousand miles were added during that year. Work was done in nearly forty States and Territories, and the average cost was $2.22 per square mile. In a number of cases the

work has been done in co-operation with State or local organizations, including experiment stations in Illinois, Louisiana, and South Dakota, the geological survey of Maryland, and Cornell University. By a new plan of publication advance sheets of separate papers are made locally available in large numbers, saving the waste of distributing widely so bulky a report. Prospective settlers, land and loan institutions, insurance companies, and schools are making increasing use of these reports. The papers included are interesting studies of particular localities, and, in addition to a description of the soils, give much information as to the agriculture, physiography, climate, history, and economic conditions of the several areas. A. P. B.

ASIA.

RAILROAD PROBLEMS IN CENTRAL CHINA.—Lieut. Col. C. C. Manifold, of the British army, shows in the *Geographical Journal* for June some important phases of the railroad projects in central China. The paper describes his journey in 1904, when he examined parts of the lower Yangtze provinces east of Sechwan, the largest and wealthiest of the provinces of China, together with a large part of the Han River valley and the region between it and eastern Sechwan, which has hitherto been little known. This investigation was carried out to ascertain whether this region might afford a route by which adequate communications could be opened between the outer world and Sechwan, with its population of about 50,000,000.

He found that the railroad from Peking to Hankow on the Yangtze River is now completed, except for the interruption at the Yellow River, which is still unbridged, and is likely to be so for some years, as the work will be a large undertaking. Passengers are now booked through on this route from Peking to the Yangtze, the Chinese are taking readily to the road as a means of freightage, and it has already begun to pay a profit. He says the Chinese are beginning to welcome the idea of railroads. Between this road and the navigable eastern tributaries of the Han the only means of transport now used is the wheelbarrow, which is by no means to be despised. One man carries in his barrow as much as 350 pounds, or double the weight that the Government pack mule is allowed to carry in India; and he transports this weight from 12 to 20 miles a day.

Lao-ho-ku is the most important trading centre on the Han above Hankow, for it is the head of navigation for large junks. Goods are from 14 to 28 days making this journey of 300 miles from Hankow. The average depth of water is about 3⅓ feet, and steam navigation on the Han is not likely to be successful for more than 100 miles, except in the most favourable stages of water. Wholesale dealers in foreign cottons at Lao-ho-ku are said to do a business of 10,000,000 taels a year, and there is also a large trade in varnish oil sent to Japan, and in general goods. This important town was not generally marked, even on the best atlas sheets, previous to 1901.

Most of the country between the Han and the Yangtze Rivers has been found to be filled with mountain ranges, barren and sterile, but with very large populations in the narrow valleys, where the soil is cultivated with extreme care. Much grain is imported in exchange for paper, which is a large manufacture. The rivers are of little commercial value, but there is much coal in the valleys, and American, Belgian, and French engineers have visited these districts to study the prospects. Col. Manifold says that the country from Lao-ho-ku west to Chu-shan in this region will afford a practical alignment for a railroad into the heart of this coal region. The railroad will probably be built if the prospects warrant it.

The expedition travelled over 300 miles through this very mountainous country,

and at present the prospects are very poor that a practicable railroad route will be found through these mountains to eastern Sechwan. Col. Manifold does not name the route which he recommends as most feasible for a railroad from eastern China into Sechwan, but he speaks of the road as destined to enter that province from the lower Yangtze, and says that Chungking, the commercial metropolis of Sechwan, must be the first objective of the road.

The Chinese provincial authorities told him they wished to undertake all future railroad construction themselves, with wholly Chinese capital and management—an ambition which Col. Manifold thought could not be fulfilled. The parties which Col. Manifold has led in the past four years have surveyed 8,000 miles of routes, and mapped them on a scale of 2 miles to an inch. When it is deemed expedient to publish the information this map contains it will be printed on a reduced scale.

Stock-raising in China.—The industry of stock-raising for food purposes is almost unknown in China. Flesh is rarely eaten. Fish on the coast and along the rivers is extensively used. Pork, and locally poultry, are the chief meats eaten in the interior.

In the province of Chehkiang pork retails at 9 cents (gold), mutton at 6½ cents, and beef at 5 cents per pound. While this is cheaper than with us, it must be borne in mind that 10–12 cents (gold) per day is a very good wage in China.

The consumption of beef and mutton is increasing, however, and the supply is decreasing, with a corresponding rise in prices. Vice-Consul F. D. Cloud of Hangchau is authority for the statement that the scarcity of stock is only due to a failure on the part of the people to appropriate the hill grasses, He says there are "thousands of acres of hill land in Chehkiang alone covered all the year with luxuriant grass," that this nutritious food is "in a mild, favorable climate and easily accessible," but it goes to waste. There is here an industry to be developed.—(*Monthly Consular Report, May, 1905.*) G. D. H.

Three Swiss Industries.—Switzerland is a country well enough watered to be clothed with rich grass; hence grazing, and especially stock-raising for dairy products, has grown to be a great industry. 740,000 cows, yielding a milk product of $44,000,000, feed on the mountain slopes, and 56 per cent. of this milk is converted into condensed milk, cheese, and butter. The cheese is made in about 2,000 small factories scattered all through the mountain valleys. Its export in 1903 was valued at $8,000,000. This does not include the considerable amount of cheese made from goats' and sheep's milk.

Another industry established, in part, upon grazing, is that of chocolate and milk chocolate making. In 1903 over $2,000,000 worth of chocolate and shells imported from Colombia, Brazil, and Central America was manufactured into these sweets, and over 4½ million dollars' worth of the product was exported.

The third characteristic industry is that of watchmaking. About 25,000 persons are employed in the Swiss watch factories, and several more thousand make watches in their own homes. The centre of this industry is now in the Berne district, which contains two-thirds of the factory hands and three-fourths of the factories. The export of the product—watches and watch parts—amounted, in 1902 and in 1903, to about $23,000,000 each year.—(*Consular Report, May, '05.*) G. D. H.

POLAR.

Amundsen's Expedition.—The recent report that Amundsen was expected soon to reach San Francisco through Bering Strait had no other foundation than the fact that the whaling fleet had been requested to carry some supplies to the Arctic

coast of Alaska and to the Mackenzie delta for his use, in case he should succeed in making the northwest passage. It was well known before he left Europe for the region of the Magnetic North Pole that he desired, after relocating the Pole and completing his studies of terrestrial magnetism in that region, to make the northwest passage in his small vessel, the *Gjöa*, if possible, coming out at Bering Strait. It has been thought that this may possibly be done, in favourable seasons, by hugging the coast of the mainland rather closely, and thus avoiding the heavy ice north of the islands along the shore. Nansen expresses the belief that it may be possible for Amundsen to make this journey; and Sir Clements R. Markham said, in his last annual address before the Royal Geographical Society:

> It is not impossible that he may make the northwest passage. Such a gallant attempt deserves success, and I hope my friend Amundsen may attain his heart's desire.

GENERAL.

Eclipse of the Sun Expedition.—The expeditions sent out by the United States Government to observe the eclipse of the sun at Bona, Algeria, and Valencia, Spain, on Aug. 29, were carried to Spain on the U. S. cruiser *Minneapolis*. The instruments and materials for the observ ation stations were transported by the auxiliary cruiser *Dixie* and the collier *Cæsar*. The expedition was in charge of Rear-Admiral Colby M. Chester, Superintendent of the U. S. Naval Observatory.

The Newark (Triassic) Traps.—During the past summer Prof. J. Volney Lewis, of Rutgers College, has made for the State Geological Survey a special investigation of the petrography of the Newark (Triassic) traps of New Jersey.

Dr. G. D. Hubbard goes to the Ohio State University.—G. D. Hubbard, Ph.D., who has been instructor at Cornell University in Physical Geography and Geology, has been appointed Assistant Professor of Geology at the Ohio State University, Columbus. He will also take charge of the geography work, and it is hoped that a group of courses in that study will be built up in the University.

Explorations of the Atmosphere.—The Blue Hill Observatory continued its studies of the upper air by means of balloons, at St. Louis, during the first three months of this year. The experiments were conducted by Mr. Clayton under the direction of Mr. Rotch. Nine more ascents were made and every balloon but one was found, and, with the attached instruments, returned to Blue Hill. The German expanding balloons, with French self-recording instruments, were used. All the balloons fell within the eastern half of a circle having its centre at St. Louis and a radius of 285 miles. On January 25, with a high barometric pressure at the ground, a temperature of $-111°$ F. was recorded at a height of 48,700 feet, this being one of the lowest natural temperatures ever observed. The experiments were so successful that Prof. Langley, Secretary of the Smithsonian Institution, granted Mr. Rotch $1,000 from the Hodgkins Fund to continue them this summer at St. Louis, in charge of Mr. Fergusson of the Blue Hill Observatory.

Soundings of the atmosphere, made at different seasons, should reveal the annual variation of temperature at great heights above the American continent, which is at present unknown.

Kites are regularly sent up at Blue Hill on the days fixed by the International Committee, and they are also being employed to ascertain the conditions above the Atlantic Ocean in the trade-wind region. Mr. L. Teisserenc de Bort, the well-known French meteorologist, placed his steam yacht at the service of Mr. Rotch, the latter sharing the expense of the cruise. Mr. Clayton, accordingly, left this country on

June 3 to meet the yacht *Otaria*, of 350 tons, at Gibraltar, and then go south, touching at Madeira and the Canary and Cape Verde Islands, and, perhaps, on to St. Paul, near the Equator, returning by a more westerly course to the Azores, the voyage occupying six weeks. The northeast trade-winds and doldrums will be traversed and the southeast trades entered. It is hoped that all the strata up to a height of 15,000 feet or more will be penetrated, so that their condition as regards temperature, moisture, and wind may be investigated.

The depth of the northeast trade-wind will be investigated and the supposed southwest or return trade, which has been observed only on the Peak of Teneriffe, will be sought and its height above the ocean, in different latitudes, measured. In case the kites do not reach a sufficient altitude, small balloons will be liberated from Madeira and their change of direction will be observed as they rise.—(Condensed from *Science*, No. 550.)

Transplanting Aquatic Food Animals.—A very important line of work which our Fish Commission is carrying on is the transplanting of aquatic food animals into waters to which they are not indigenous. The *Report* of the Commission for 1903 mentions two very successful instances of the acclimatization of native fishes. About 30 years ago the shad and the striped bass of the Atlantic coast were introduced on the Pacific coast; the slender colonies became established, flourished, extended themselves widely, and multiplied to such an extent that these two species now rank among the leading food fishes of the Pacific States, and in some places exist, perhaps, in greater abundance than in any waters on the Atlantic coast. The total cost of planting these fish on the Pacific coast was less than $5,000. The aggregate catch to the end of 1902 was 18,900,000 pounds, worth $670,000. The marine establishments of the Commission have for years been hatching cod in large numbers on the north Atlantic coast, with the result that since 1889 a very lucrative shore cod fishery has been kept up on grounds that were entirely depleted, or had contained only few cod. The Commission is thus proving that the effects of human improvidence may be counteracted by man's ingenuity and ability to aid nature.

PERSONAL.

Dr. Franz Boas has resigned the curatorship of the Anthropological Department of the American Museum of Natural History. He is still connected with the Museum, however, and will conduct the researches and publications of the Jesup North Pacific Expedition and of the East Asiatic Committee.

Mr. Jacob Schiff, of New York, has presented $50,000 to Harvard University, to be devoted to exploration in Palestine.

At the annual meeting of the Royal Geographical Society, in May, Sir George D. T. Goldie was chosen to succeed Sir Clements Markham as President of the Society. The new president has travelled extensively in Africa, especially in the Niger regions, is regarded as an expert on Niger questions, and was the founder of the British Protectorate of Nigeria. The annual dinner of the Society was really a complimentary banquet to the retiring president, who devoted himself with the greatest energy to the interests of geography and the affairs of the Society during his long administration. Messages of regret upon the retirement of Sir Clements Markham were read from the King and the Prince of Wales.

NEW MAPS.

AFRICA.

Egypt.—Carte du Lit du Nil entre Chellal et Assouan. Scale, 2,130 feet to an inch. Par R. Fourtau. *Bull. de la Soc. Khédiv. de Géog.*, Series 6, No. 7. Cairo, 1905.

Based upon the Government surveys, the map shows the primary and secondary faultings and the principal bars, exposed at low water; also a profile of the chief channel of the Nile between the upper bars of Bab-el-Kibir and Bab-el-Madaik, in the cataract so called. The topography on both sides of the river is sketched. The map illustrates a monograph by Mr. Fourtau, a French geologist and civil engineer, whose duties as an engineer called him to Assuan, where he improved the opportunity to study the physical geography of the cataract. He says that the torrential action of the Nile waters produces scarcely any effect in wearing away the rocks, excepting at the bends of the channel below the cataract, and that the actual condition of the Nile bed between Chellal and Assuan may be ascribed to a series of faults that are plainly recognizable. The historic monuments show that the Assuan cataract has not been sensibly modified by the work of running water for the last 6,000 years—a fact that is to be attributed to the dissolving of the feldspar in the granite and its replacement by silicates of iron-manganese, that are insoluble under the conditions which decompose the feldspar.

German East Africa.—Karte von Deutsch-Ostafrika in 29 Blatt und 6 Ansatzstücken. (Sheets G 4 and H 4 Ssongea and F 4 Gawiro.) Scale, 1:300,000, or 4.73 statute miles to an inch. Unter Leitung von Paul Sprigade und Max Moisel. Dietrich Reimer (Ernst Vohsen), Berlin, 1904.

The publication of this important work began in October, 1895, about ten years before the two sheets named above were issued. When we compare these sheets with "A 1. Kivu-See," the first to be published, we are impressed with the vast accumulation of material for map-making within the past decade. "Kivu-See" sheet contained the work of only five or six travellers, and was greatly lacking in detail and accuracy. It is valuable now chiefly as a record of what was known ten years ago of the region of active and extinct volcanoes in German East Africa. The Ssongea and Gawiro sheets, the latest to be issued, show the southern part of the German coasts on Lake Nyasa and the colony to the east of the lake as far as 36° E. Long. The compilers of the Ssongea sheet had before them the work done by explorers and surveyors on 31 routes in this district, and the mother maps they produced along these routes numbered 268 sheets. The latitude and longitude of eight places in this small district were available for their use, and they were able to place on their map much information concerning the forms of the physical features. A few more sheets will complete the whole map, and a revision of the first half of it will then be required immediately, if the map is to be kept up to date.

German East Africa.—Die Eisenbahn Dar-es-Ssalam-Morogoro. Scale, 1:600,000, or 9.4 statute miles to an inch. *Deutsche Rund. f. Geog. u. Stat.* Vol. 27, No. 7. A. Hartleben's Verlag, Vienna, 1905.

Shows (black) the first survey for this railroad, and (red) the later and more northerly survey which has been adopted. The railroad will extend inland from Dar-es-

Salam, the capital of German East Africa, to the west side of the Ulugara Mountains, whose minerals are said to be worth exploiting. There is a comparatively large population for the first fifty miles to and across the valley of the Kilgani River. This coastal zone may be the limit of the possibilities of large agricultural development. It is believed that the railroad will develop in this zone the plantation-raising of cotton and other fibres and oil plants. The map is a good one, and gives some facts relating to varieties of vegetation, geology, etc. The length of the road will be 230 kilometers, the gauge one meter, and the East Africa R.R. Co. says it will complete the road in two years, though its contract with the Government gives the Company five years. The Company is to receive as its property a strip 100 kilometers wide to the right and left of the line. Early this year a long pier was extended into the bay at Dar-es-Salam to facilitate the landing of railroad supplies.

NORTHERN NIGERIA.—Map of the Nigeria-Kamerun Boundary Survey. Scale, 1:1,500,000, or 23.7 statute miles to an inch. *The Geog. Jour.*, July, 1905, London.

Illustrates a paper by Col. L. Jackson of the British Commission. A line about 32 miles long, between Mount Bagele and Beruere, extending approximately east and west, was the base for the triangulation carried from Yola, on the Benue River, to Lake Chad. Both the British and German commissioners carried out triangulations, the results of which differed at Kukawa, the northern terminus, by 11 seconds of latitude and longitude. The work of delimiting the boundary occupied about ten months of 1902.

AMERICA.

CANADA.—Yukon Territory (Kluane, White, and Alsek Rivers). From surveys by the International Boundary Commission, 1893–95; J. J. McArthur, 1900; A. C. Talbot, 1899, and J. B. Tyrrell, 1898. Scale, 1:400,000, or 6.32 statute miles to an inch. Department of the Interior, James White, Geographer, Ottawa, 1905.

This large sheet includes only the southwest corner of the Yukon Territory. It indicates the culminating points (or nearly these points) of Mounts Seattle (10,000 feet), Hubbard (16,400), Vancouver (15,617), Cook (13,700), Augusta (14,000), and St. Elias (17,978), as on the boundary line between the United States and Canada. Relief features are shown by contours along the waterways mentioned and in the coast regions of Yakutat Bay and the southeastern glaciers of the Mount St. Elias system.

CANADA.—Standard Topographical Map (Ontario, Hamilton Sheet). Scale, 1:250,000, or 3.95 statute miles to an inch. Department of the Interior, James White, Geographer, Ottawa, 1905.

Another sheet of the fine large-scale map of Canada that is now being produced. It embraces the tongue of land between Lakes Ontario and Erie, in which contours of depth are shown for every ten fathoms.

CANADA.—Map of the Province of New Brunswick to Illustrate the Quality of its Soils. Scale, 32 statute miles to an inch. *Proc. and Trans.* of the Roy. Soc. of Canada, Second Series, Vol. 10. Ottawa, 1905.

A sketch map in which the excellence of the soil is approximately proportional to the depth of the shading, the best lands being black. The wearing out of thin soils in the south caused the abandonment of many settlements. The map is one of the illustrations in a monograph on "The Origins of Settlements in the Province of New Brunswick," by William F. Ganong.

2.—Map of the Province of New Brunswick to Illustrate the Historical Origin of its Settlements. Scale, 16 statute miles to an inch. With the same monograph.

A map in colours showing the distribution of the Indian Reserves, the French, the English, and other settlements.

3.—Map of the Province of New Brunswick to Illustrate its Physiographic Features. Scale, 16 statute miles to an inch. With the same monograph.

An excellent map, drawn by Mr. Ganong, based on the topographic survey and printed without names. The relief is shown by contour lines with 100-feet interval. All the waterfalls and the head of tide in the rivers are shown.

CHILE.—Estero Comau ó Leptepu. Scale, 1:120,000, or 1.8 statute miles to an inch. Oficina Hidrográfica, Valparaiso, 1905. (Price, $1.)

Black-and-white chart, with heights and soundings in meters, giving the results of the surveys of the Hydrographic Commission in 1900. The deep Comau Inlet was sounded throughout and the elevation of the most conspicuous mountains was ascertained. This part of the coast is separated from the north part of Chiloe I. by the Gulf of Ancud.

CHILE.—Puertos del Canal Cockburn, Tierra del Fuego. Puerto Barrow—scale, 1:5,000, or .07 statute mile to an inch, surveyed in 1901; Puerto Soffia—scale, 1:15,000, or 1,250 feet to an inch, surveyed in 1903. Hydrographic Office, Valparaiso, 1905. (Price, 50 cents.)

Charts of two new ports in the Cockburn Channel, one of the reaches used by ships passing into or out of Magellan Strait. These ports have not yet appeared on the latest atlas sheets.

UNITED STATES.—Preliminary Map of the Central Great Plains showing the Structure of the Dakota Sandstone. Scale, 40 statute miles to an inch. By N. H. Darton, U. S. Geol. Sur., Prof. Pap. No. 32. Washington, 1905.

Shows the outcrops of this sandstone and the vast area underlain by it. This water-bearing formation is usually overlain by thick masses of impermeable rocks; and as the water is under great pressure, this is one of the chief sources of artesian supplies.

UNITED STATES.—Preliminary Map of the Great Central Plains, showing the Economic Geology. Scale, 40 statute miles to an inch. By N. H. Darton, U. S. Geol. Sur., Prof. Pap. No. 32. Washington, 1904.

An excellent map, showing the distribution of the mineral and metal resources of the central great plains according to our present knowledge.

UNITED STATES.—Geological Atlas of the United States, No. 125. Rural Valley Folio, Pennsylvania. Washington, 1905.

This quadrangle, drained by the Allegheny and its tributaries, has important mineral resources, and the distribution of the coal mines and gas and oil wells is shown on the sheet of structure and economic geology.

ASIA.

CHINA.—Sketch Map of a Journey from Fu-chau to Kiu-kiang. Scale, 1:750,000, or 11.84 statute miles to an inch. By Major A. B. Hamilton. *The Geog. Jour.*, July, 1905, London.

The map is based on a sketching-board traverse, and the heights, in feet, are aneroid determinations. While the circumstances prevented the collection of exact data for a map, the product is of value as illustrating a route from the seaboard to the Yangtze Valley of which very little has been known.

PHILIPPINES.—Map of the Island of Luzon. Scale, 44 miles to an inch. Showing Railways. Fifth Ann. Rep. of the Philippine Commission, Part 3. Washington, 1905.

The map is photographed down from the larger map of the Bureau of Insular Affairs, is almost illegible without a magnifying glass, and has the serious disadvantage of using the same symbol to indicate completed railroads and also the boundaries of the provincial subdivisions. A person unacquainted with the facts might think that completed railroads were well distributed over Luzon, instead of being confined to one line between Manila and Dagupan.

EUROPE.

IBERIAN PENINSULA.—Germanische Völker und Ortsnamen auf der Pyrenäen-Halbinsel. Five maps founded upon No. 14 in the Spruner-Menke Histor. Handatlas. *Deutsche Erde.* Vol. 4, No. 2. Justus Perthes, Gotha, 1905.

Illustrates an article on German-Spanish place-names by Johannes Jungfer. The maps show the kingdoms of the Visigoths and other Teutonic peoples in the peninsula and the distribution over it of German place-names due to these invasions.

SWITZERLAND.—Carte Générale de la Suisse. Par H. Kümmerly. Scale: 1:400,000, or 6.3 statute miles to an inch. H. Kümmerly & Frey and A. Franke, Bern, 1904 (?).

A well-drawn and attractive map in colours, with relief brought out by shading and oblique illumination, the effect being artistic and panoramic. The light and dark effects are so handled in most cases as to give a clear definition of the topographic forms. This information is accompanied by plainly-printed nomenclature, hydrography, railroads, tunnels, highways, castles, ruins, etc., the whole making one of the fullest and best maps of Switzerland produced on this scale. An index accompanies the map.

UNITED KINGDOM.—River Mersey from Rock Lighthouse to Eastham and Garston. Scale, 1,200 feet to an inch. Henry Belam, Marine Surveyor, Mersey Docks and Harbour Board, Liverpool, 1901.

UNITED KINGDOM.—Liverpool Bay. Scale, 3,150 feet to an inch. Surveyed by the Marine Surveyor of the Mersey Docks and Harbour Board, Liverpool, 1904.

The chart of the Mersey has soundings in feet and inches, figures showing depths below and heights above the datum line. It shows in what parts of the river pilotage is compulsory, where vessels may not be loaded or discharged without special permit, etc. The chart of Liverpool Bay, issued annually, is accompanied by tides reduction tables and notes on the methods of using the tables.

THE OCEANS.

NORTH PACIFIC.—Drift of the disabled S. S. Carlisle, Nov. 5, 1904–Jan. 25, 1905. *Bulletin* of the Philippine Weather Bureau, Dec., 1904, Manila.

This disabled steamer wandered at the mercy of the winds and waves for two months and twenty days. The map of the long journey is published because the track of the *Carlisle* gives an excellent opportunity to study the air currents in that zone of the Pacific embraced by Japan on the north, the Ladrones on the east, and the Philippines on the west. The drift began about 500 miles east of Northern Nippon, and its general direction, with frequent variations for a few days, was west, east of south, and south of west, to San Miguel Bay, on the east coast of Luzon.

PILOT CHART OF THE NORTH PACIFIC OCEAN FOR AUGUST, 1905.—Hydrographic Office, Washington. (Price, 10 cents.)

The Hydrographic Office warns mariners not to place too much reliance upon predictions concerning currents near the Aleutian Islands and in Bering Sea, as information is meagre. For more than a year each issue of this Pilot Chart has contained the statement that the fishing banks shown in red "were tabulated and described in several previous issues of the Pilot Chart." It would serve the convenience of persons seeking this information if the above statement might be replaced by reference to one or more numbers of the Chart containing the tables and description referred to.

BOOK NOTICES.

Josias Simler et les Origines de l'Alpinisme jusqu'en 1600, par W. A. B. Coolidge. Avec Illustrations et Carte. Grenoble, Allier Frères, 1904. Large 8vo.

The voluminous work bearing this title stood in need of the explanation set forth in its preface. Few persons not widely read in the national literature of Switzerland have ever heard of Josias Simler, the patriotic Zurich professor and author, of the sixteenth century; again, the second part of the title—The Beginnings of Mountaineering Down to the Year 1600 (if for the moment we may be permitted to translate "*alpinisme*" by a familiar word)—causes a start of natural surprise when connected with a work of over a thousand pages. The passion for scaling mountains is generally held to be too recent to possess such traditions, and, really, it has had none until a comparatively late day, when certain of the more scholarly devotees of a sport which is pre-eminently the sport of intellectual men have conducted researches through the classic literature of the ages, as well as through much still unedited. The acme and sum of many such labours appear in the monumental work before us.

Rev. W. A. B. Coolidge—an American by birth, a Briton by education, a Frenchman (and particularly a Dauphinois) by adoption—is its responsible author. A member of several Continental alpine clubs, a founder of the active *Société des Touristes du Dauphiné*, the author of valuable guide-books for that land of superb mountains, as well as for the neighbouring regions of the Swiss Alps, and—best of all requisite endowments!—inspired with an unfailing and enlightened enthusiasm for the mountain in general, a more competent editor for such a work could hardly be found. But the enthusiasm and leisure of a single man would have been unequal to the task of bringing out a work of this character, even though "begun in 1895 and zealously pushed from 1899 to 1903," had he not secured the collaboration of numerous gentlemen—French, English, Swiss, and Italian—who have aided in the extensive research necessary to determine many questions of fact in varied fields of inquiry.

Josias Simler (1530–1576), trained for the Protestant pulpit, but from his thirtieth year Professor of Old Testament Exegesis in the École Caroline at Zurich, was pleased to vary his theological activities with studies relating to the history of his native land, familiarizing himself, among other sources, with the extensive *Chronik* of Johannes Stumpf, which appeared written in German in 1548. Simler conceived the idea of preparing an enlarged edition of this work, and in Latin, "in order to make known to foreigners unfamiliar with German the history and institutions of Switzerland, as also its scenic beauties." The scheme grew under his hands,

numerous collaborators were engaged with him more or less continuously; but failing health prevented the completion of his master-work. In 1574, for the purpose of winning new collaborators and to interest the general public in the forthcoming larger work, he issued as a sample the portion relating to a single canton, Valais, to which he appended a special treatise of some three hundred pages on the Alps, "Valais being *par excellence* an alpine district among whose mountains many things of interest and beauty are to be seen." This appendix, under the title "*De Alpibus Commentarius*," passed through several editions, two (possibly three) independently in 1574, 1633, and 1635 (?); again, in 1735, it appeared, forming one of a collection of brief essays concerning Switzerland. This Commentary it is which forms the nucleus of the weighty volume before us, embedded with its 307 pages—the Latin original, faced with a translation into peculiarly current French—in the midst of the thousand pages that go to make up the entire work.

Following the plan of the original text, the editor has divided Simler's work into twenty chapters, placing as headings the marginal rubrics of the original: The Name "Alps"; their Geographical Extent; Silius Italicus' Description; Early Passages; Hannibal's Passage; The Cottians; Graians; Pennines; Highest Alps (*De Summis Alpibus*); Lepontines; Rhætian Alps; Julian and Carnic Alps; Difficulties and Dangers; Peoples; Hydrography; Minerals and Metals; Trees; Shrubs and Plants; Fauna. The work, doubtless, comprehends all that was known, or supposed to be known, to the sixteenth century concerning the land that was destined to become, three hundred years later, the most attractive country in the habitable world to the student of natural science and the tourist. Hence the charm of the old treatise, which in 1895 inspired two friends (the author and M. Felix Perrin, his principal collaborator, while engaged in a "high tour" in which they had crossed one of the historic snow-passes described in Simler's work) to pledge themselves to publish it once more and in a modern tongue, curiously enough for the very reason that had led Simler to do Stumpf's Chronik into Latin—in order to secure for it a wider reading among "those who know!"

Now, about this treatise and its transcription as a "*noyau*"—one is tempted to suggest rather "*moyeu*" (nave or hub)—are gathered, or from it diverge, a variety of treatises more or less germane, which enter as elements into the author's conception of "alpinism." Mr. Coolidge defines the word thus: "All that relates to ascents of lofty peaks or the traversing of high snow-passes." He then adds:

> To the average mind an up-to-date alpinist is only a climber, fain to roam over lofty ranges, and devoting himself primarily to the physical pleasure of arduous and dangerous climbing feats, though from time to time, as a secondary consideration, he may become interested in the history of the Alps, their inhabitants, or the scientific and other questions relating thereto. In this restricted sense the word is used in a single section (C) of our Introduction.

In general, he uses the word "in its etymological and extended signification to define '*la science des Alpes*,' thus embracing everything nearly or remotely concerning the Alps." To cover the whole of his work he would have to go farther and say "touching all known mountain regions," for some of the interesting facts here collated have to do with regions well outside the Swiss and French Alps.

Only with this broadened definition could the conjunction of the name of Simler and the history of alpinism escape the charge of incongruity, for poor Simler, "from the age of twenty-nine a victim of the gout and other maladies," probably knew little or nothing at first hand of what he reported from the high altitudes. The sole passage in all his works which apparently alludes to a personal experience upon the mountains is the description of the glorious spectacle of an Alpine sunrise witnessed from some high point.

Mr. Coolidge concludes, however, that, if it really be such, it refers either to Simler's experience in some ascent made before he was fourteen years old to a hill-top near his native village, or, later, to heights in the immediate vicinity of Zurich—in any event, to no truly Alpine peak. He has, however, "risen above his contemporaries by editing an Alpine Encyclopedia, and so has deserved well of all those, climbers or not, who regard the Alps as the finest region on earth."

Vindicating thus Simler's title to regard as the father of modern mountaineering, the author does not hesitate to gather about the *Commentary* all that was known, and, so far as it has been discovered, all that was thought, about mountain ascents previous to the year 1600.

In the forefront is set the now famous letter of Dr. Conrad Gesner to his friend Avienus (Jacob Vogel) on "The Love of Mountains" (*De Montium Admiratione*), written in 1541—"a letter constituting one of the charters of alpinism"—reproduced in the original Latin and in translation. The "Introduction" (190 pages) consists, first, of an historical sketch of mountaineering under three sub-titles: (A) Ascents of peaks; (B) Traversings of snow-passes; (C) Practical Mountaineering. Under C are discussed (1) the mountain *per se;* (2) the mountaineer upon his peak, with subdivisions: (*a*) his implements, (*b*) his amusements ("fantaisies"), glissading, name-carving (for, alas! this whim dates back beyond 1555), tobogganing, rolling down rocks, and blowing on Alpine horns, and (*c*) his guides—a chapter naturally much resembling that on "Snakes in Iceland." As a specimen of the interesting facts collated, we may mention the following: "Originally alpine horns were used by the herdsmen in chanting their prayers; this custom still exists in châlets on the slopes of the Pilatus range."

Section A presents, doubtless, the most complete register to be consulted of ascents in the Alps previous to 1600. Yet of even greater interest are the original documents, eighteen in number, from which our knowledge of these expeditions is derived. First in order is the page from Livy describing the ascent of the Hæmus (9,300 feet) in the Balkan Peninsula, made by Philip V. of Macedon in 181 B.C. Among those that follow are the full text of a long Latin letter of Petrarch, describing his ascent of Mont Ventoux in 1336, and his emotions and religious meditations on that occasion; the ascent in 1492 of "le Mont Inaccessible," as it was named and believed to be, Mont-Aiguille, near Grenoble, by the Seigneur de Dompjulien, by order of the sovereign, King Charles VIII. (this is the first recorded ascent of a really audacious character accomplished by the aid of "*subtilz engins*," ladders, and the like); again, a brief note by Leonardo da Vinci touching the phenomena observed by this versatile genius in his ascent of Monte Bô (8,520 feet), made about the year 1511.

The remaining portions of the book are devoted to a biographical sketch of Simler, and to elaborate and most interesting notes both on the Commentary itself and on the annexed documents. To these, although they represent, doubtless, the most exacting and laborious work involved in this monumental publication, we can merely allude in passing. Reproductions of portraits of Simler, Gesner, Tschudi, and Stumpf from contemporary sources, the facsimile of a letter written from the summit of Mont-Aiguille by Dompjulien to the President of the Parliament of Grenoble, a map of the Bernese Oberland dating from 1578, and a few other interesting illustrations, twelve in all, add to the value of this notable volume. C. E. F.

XX., XXI., XXII. u XXIII. Jahresbericht (1901, 1902, 1903 u. 1904) des württembergischen Vereins für Handelsgeographie. Stuttgart, 1905.

The contents of this report on the work of the Society during the period embraced

by the first four years of this century are interesting. Leaving aside the official sections, we meet with three papers (lectures), all of which can be sincerely commended. The first one is of less direct interest on this side of the Atlantic than the others, treating, as it does, of Bosnian forests and Bosnian cultivated areas, but the style of writing of its author, Dr. Vogel of Stuttgart, is pleasing and, to a fair extent, plastic, and it conveys much interesting information on parts of Bosnia comparatively little known.

The second: Impressions of Travel from the Department of Ancachs in Peru, by Dr. Hugo Debach at Schaffhausen, is even more attractively written. The Department of Ancachs is famous for its mines, and its orography was hitherto only known through the work of Raimondi: "*El Departamento de Ancachs y sus Riquezas minerales*" (Lima, 1873), and especially by the map accompanying it. Dr. Debach well characterizes the two important mountain chains that traverse the greatest part of the Department from north to south (approximately), and parallel to each other, the *Cordillera negra*, or coast range, and the *Cordillera blanca*, farther inland, a towering snow-clad chain, the summits of which attain an elevation of as many as 22,000 feet. The great abruptness of the former towards the east is a feature not met with in all the sections of the Peruvian coast range. Dr. Debach's landscape pictures are pleasing to read, although (as German literature of a modern date in general) they are still far from the well-tempered poetry, coupled with accurate description, peculiar to the style of Humboldt and Gustav Radde. Ethnography, of course, enters into the frame, and it is only to be regretted that the author knows the Indian so little, and looks at his past through the eye-glasses of ordinary school routine. It is a very commendable effort, however—the more so as it it places before us pictures of a region little known to the general public.

The lecture by Dr. A. Hahl on the geography of the German colonial area of New Guinea concerns us more directly, as treating of clusters of islands in the vicinity of our Philippines. A cursory glance at these groups, like the Carolines, Marianas, and others, it still is well worthy of careful reading. The ethnographic picture is somewhat confused, and the linguistic part of it attempts subdivisions, with technical terms perhaps too technical for the general public.

Very valuable are the reviews of a number of other lectures given at the Society's meetings in the four years referred to above. They enable the reader to form a very clear idea of their contents, testifying to the scrupulous care with which every review has been prepared.

A. F. B.

The Maintenance of Health in the Tropics. By W. J. Simpson, M.D. viii and 118 pp. and 14 Illustrations. John Bale, Sons & Danielsson, Ltd., London, 1905. (Price, 2s. 6d.)

Dr. Simpson wrote this Handbook at the request of the London School of Tropical Medicine, and it was published under their auspices. It deals with tropical hygiene in a simple and popular manner, treats of the characteristic diseases of the tropics, and gives special prominence to prevention and to protection against deleterious influences. The longest chapter is given to malarial fever and protection against the bites of mosquitoes. An important reduction in the rate of mortality among natives of the temperate zone living in the tropics has been observed for some years past. Medical men say this is due to the better knowledge acquired in the past two decades as to the hygiene to be observed in the equatorial regions. This book, written in the light of long experience, will be useful to those residing in or visiting the tropics.

Türkei, Rumänien, Serbien, Bulgarien. (Sechste Auflage.) xii and 384 pp., 10 Maps, 30 Plans, 1 Panorama, 2 Views, and Index. Bibliographisches Institut, Leipzig, 1902. (Price, M. 7.50.)

This is one of the Meyer series of Eastern guide-books, the other three covering Greece and Asia Minor, Egypt and Palestine, and Syria. The extension of railroads through the Balkan States has stimulated pleasure travel in that direction, and such a book, prepared with the painstaking care for which the long series of Meyer Guide-books is noted, is a necessity of the journey. Large regions in these States are not treated, because the book is confined to those routes where the tourist may travel without danger and with comfort. The work is uncommonly interesting for a guide-book, because the reader is introduced to so many unaccustomed phases of life and development. Museums and picture galleries naturally are not conspicuous in these pages, but all the important cities are well mapped, and their points of interest, the excursions from them, and the striking views, historic spots, and buildings along the railroad are indicated. The maps are an especially good feature, and Constantinople is described, from the tourist's point of view, with great thoroughness, about a third of the book being given to that city.

Stanley, Le Roi des Explorateurs, par Joseph Joûbert (1840–1904). 54 pp. Germain et G. Grassin, Imprimeurs-Editeurs. Angers, 1905.

In these well-written pages the praises of the hero are so ingeniously mingled with irony and sarcasm that the author seems to be facing two ways at once.

The King of Explorers is introduced as a majestic menhir rising high above the megalithic line of men. He is compared to Alexander the Great, Aristotle, Copernicus, Cuvier, Champollion, Edison, Goethe, Napoleon I., and Pasteur! The range is wide. We are told what Stanley might have been if he had lived four centuries ago, but nothing is said of what he is to be in the year 2,300—an omission which M. Joûbert should not overlook in a second edition of his pamphlet.

The sketch of Stanley's career, so far as this can be followed through the mazes of the author's eloquence, is familiar enough; but there is nothing to show why this familiar story should have been told once more. There is, indeed, an appearance of originality in the comparisons introduced, but these would have gained in brevity and in vigour if they had been summed up in the formula: "Let us compare him to everybody."

On the whole, the Book of Ecclesiastes is not sufficiently studied.

The Traveler's Handbook. A Manual for Transatlantic Tourists. Compiled by Josephine Tozier. xv and 211 pp. Funk & Wagnalls Company, New York, 1905.

Suggestions, information, and advice concerning travel in Europe and the ocean voyage, clearly written and well arranged. The book covers a thousand-and-one minutiæ relating to preparation for the journey—the ocean liners, life on board ship, seasickness, fees; in fact, all the detail that becomes mere routine to the experienced traveller, but often involves others in annoyance and perplexity. Two chapters are given to England, one each to Germany, France, The Netherlands, Italy, and Egypt, with a great deal of general information about travel on the Continent and the return voyage. He who acquires all his travel-lore by personal experience pays a high price for it, and many suggestions in this little book will conduce to comfort and money-saving. The book covers the whole subject, is accurate, and one of the best of its kind.

Nordafrikanische Touristenfahrten (Algerien, Tunisien, Tanger). Von Curt v. Zelau. (148 pp. and 35 Illustrations from photographs.) Verlag von Gebrüder Jänecke, Hannover, 1904. (Price, M. 3.)

The volume contains much pleasant description, facts, and opinions as to the condition of the people and the influence and benefits of French rule, and a great deal of information of use to other travellers in the same region. Visitors to Biskra may now gain some experience in desert life by camel journeys to neighbouring oases.

The Jordan Valley and Petra. By William Libbey, Sc.D., and Franklin E. Hoskins, D.D. Two Vols. Vol. I, xv and 353 pp., and 74 Illustrations. Vol. II, viii and 380 pp., 85 Illustrations, 7 Appendices, Index, and Map. G. P. Putnam's Sons, New York, 1905.

For several reasons these handsome volumes are among the most noteworthy of recent additions to geographical literature. As the work is the narrative of a journey in the Jordan Valley, and the study especially of the eastern part of it, and of the physical conditions, the life, and the ruins of the mountain edge of the desert plateau beyond the valley, the reader is taken almost from the outset into regions that few modern travellers have seen and among monuments of some of the older chapters in human history. But the journey is extended still farther south to scenes that the Exodus made familiar to the Hebrews—to the fields where they fought with the Moabites and Edomites, to the wonderland around the ancient city of Petra, and to that city itself, where the East and West once met to barter, and which is unique among all the great sights of the world.

The work thus treats of the uncommon, and its ample pages contain much of interest for several classes of readers. Its contributions to the geology of that region will command attention, and the book enlarges our knowledge of the town dwellers and nomads living under Turkish rule, almost cut off from intercourse with the outer world. In some instances there is no doubt that the comment in this work on little-known scenes of Biblical history here described may be helpfully read in connection with the ancient narrative.

The perfected modern camera, skilfully handled, has at last been called in to illumine this neglected corner of the earth. Prof. Libbey has made many fine photographs in various parts of the world, but his Arctic, west American, and Hawaiian views are excelled, if anything, by this large series of pictures, caught in the dry air of an Oriental steppe region, clearly and sharply defining the ruins of old cities, temples, and theatres, the towns of to-day, the nomads, the cave dwellers, the cañons, valleys and sand plateaux, and many other aspects of the old-new country that will help to strengthen the impression made by the descriptive text upon the memory. The illustrations are certainly a very remarkable feature of this book.

Mr. Libbey, who occupies the Chair of Physical Geography at Princeton, fortunately had as his co-worker on this journey Dr. Hoskins of the Beirut Mission, who, in twenty years, had become well acquainted with the land and people of the more accessible part of this Turkish domain, and also knew Arabic and the Government officials. These advantages secured aid and favour that made the trip possible, and the journey of over 600 miles on horseback was without an accident. The authors are all the more to be congratulated because the Turkish Government has for many years refused to allow travellers to use the pilgrim road east of the Jordan, on the ground that it was not safe.

Prof. Libbey says:

The mountains east of the Jordan are not peaks, though peaks are found near Hermon and in the

Jaulan, but rather high table-lands, presenting an almost unbroken skyline to the observer west of the Jordan. For two centuries they have been shrouded in mystery almost impenetrable. During the last three decades they have begun to yield their secrets to the geographer, the geologist, the archæologist, the historian, and the traveller, and each of these departments of science has been treated to a series of brilliant surprises.

Along this "mysterious unbroken skyline" it has been found that most of the geographical names are the same as those recorded in the early part of the Bible. The region is proving a paradise for the student of the old civilizations that swept over it, strewing these ranges with ruins splendidly preserved to this day.

Among the objects described and photographed are the finest Crusader ruin extant at Kerak in Moab, one of the defences erected along the land frontier of the Holy Land to keep out the infidel; the mosaic map at Madeba, of parts of which ten photographic reproductions are shown; the magnificent ruins of Jerash, which the authors call the finest example of an ancient Greek city; the power of Rome as recorded in her military roads and camps, of which some of the best examples are on the plains of Moab and among the mountains of Edom; and the wonders of Petra, to a minute study of which 170 pages are given. Including the remarkable photographs that accompany this description, the authors have made a splendid addition to all that has been written and pictured concerning "one of the strangest, most beautiful, most enchanting spots upon the face of the earth."

Tht appendices give the itinerary and caravan time between halting-places; elevations taken from the mean of three aneroids; list of visitors to Petra during the past century; a description of the Hedjaz railroad project; explanation of the photographs of the mosaic map; and a list of Scripture references. There are also sixteen photographs of fossils which Prof. Libbey brought home, most of them embedded in large numbers in pieces of slab. A description, in twenty pages, of the fossils and rocks collected is written by Gilbert Van Ingen, Curator of Invertebrate Paleontology at Princeton University.

It is possible that a few years more may see this region more accessible to travellers. Later visitors are not likely to find more helpful suggestions for such a journey than in this book.

The Organization of Ocean Commerce. By J. Russell Smith, Ph.D. No. 17 of the series in "Political Economy and Public Law," published by The University of Pennsylvania. viii and 155 pp., 2 Appendices, Index, and Map. Philadelphia, 1905.

This is an investigation of one of the leading factors in economic geography. It was written for the general public and for students of commerce in high schools and colleges. The book has, in large part, grown out of the concrete studies of commercial activities which engaged Dr. Smith for many months while he was assisting the Isthmian Canal Commission in their rate and traffic investigations. During this work he examined many volumes of unpublished statistics in the Government bureaux and custom houses, corresponded extensively with steamship companies, importers, exporters, and manufacturers, and later carried out the same lines of inquiry in the leading ports of Europe.

The result of these studies at first hand and of the reading preparatory or incidental to them is this well-written, methodical discussion of the whole subject of ocean commerce. The types of vessels and the part of each in the ocean trade, whether chartered singly or run in lines of ships; ocean freight rates and comparison with railroad rates; trade routes for steamers and sailing vessels and their competition in the world's carrying trade; coal and coaling stations, Government control and supervision of shipping routes, the probable effects of the Panama Canal, questions

relating to harbours and ports and the handling of freight, are the topics of this book. The concluding chapter treats of the shortened routes, the greater safety of navigation, the alliance of steamship and railway, and other conditions that mark the present tendencies in commercial organization.

The principles of commerce, or, in other words, the philosophy of the subject, come into strong light in this presentment and discussion of the data. The following comparison between the coming Panama Canal and the Suez Canal is no surface treatment of the matter:

> The question of toll-rate is of especial importance in the management and traffic of the Panama Canal, because such a large proportion of its trade might be driven to other routes by high rates of toll. In this respect it is signally different from the Suez Canal. The American canal has four main fields from which and to which its commerce may come and go: Pacific North America, Pacific South America, eastern Asia and Australasia. Two of these four trade areas are upon the margin of the zone of canal influence. A high rate of toll might drive away completely the commerce of Australasia, most of the South American, and, if accompanied by low tolls at Suez, a considerable share of the Asiatic trade might also be lost to the American canal.
>
> But a reduction of the Suez rate is highly improbable, because the reasons that prompt to low tolls for the Panama Canal, prompt to high tolls for the Suez. Of the traffic for this canal, a surprisingly small portion is upon the margin of its traffic zone, only the Australasian, and the greater part of that follows the Good Hope or Magellan routes. The great bulk of Suez traffic is bound to or from southern and eastern Asia, and the saving is so great that the shippers can afford to pay high tolls. If the tolls were raised one-third or one-half, nearly all of the traffic would at present continue to use the canal; and if the rate were reduced one-third or one-half there would be but slight gains in tonnage, certainly not enough to make up the loss in revenue.

No text-book can give so much space to any one factor in commerce, and this book will make admirable supplementary reading in the higher commercial courses of the schools. The map displays the meaning of much well-collated material, but by methods showing that some map houses still linger in the primitive era of cartographic technique.

The Bontoc Igorot. By Albert Ernest Jenks, Department of the Interior. Ethnological Survey Publications, Vol. I. 266 pp., 154 Plates of Photographs, and Sketch Maps, 9 Figures in the Text, and Index. Bureau of Public Printing, Manila, 1905.

This is the first of a series of scientific studies to be issued by the Ethnological Survey for the Philippine Islands. It was decided that the Igorots of Bontoc pueblo, in the province of Lepanto-Bontoc, northern Luzon, are as typical of the primitive mountain agriculturist of Luzon as any group visited; accordingly, Mr. and Mrs. Jenks lived five months among them in the early part of 1903, collecting the information contained in this large monograph.

Their pueblo or village contains from 2,000 to 2,500 inhabitants, and is only one among many pueblos scattered among the mountains. There are from 150,000 to 225,000 Igorots in Igorot land, and the name means "mountain people." They are practically unmodified by modern culture and are constant head-hunters. There are some differences in their culture which distinguish one group of the people from another. The inhabitants of Bontoc, for example, have not developed the headman, who, immediately north of the Bontoc area, in Tinglayan, is the pueblo leader. The control of the pueblos of the Bontoc area is in the hands of groups of old men.

Mr. Jenks enters with much thoroughness and detail into the discussion of the traits, customs, and conditions of the group among which he lived. There are 22 subdivisions in his chapter on their general social life and 61 in his chapter on their economic life. He gives long chapters to their political and æsthetic life, religion, war and head-hunting, mental and physical characteristics, folk-tales, and language. The large and excellent photographs show many typical aspects of the country—the

men, women and children, individuals or groups engaged in their various labours, their dances, tattoo-marks, implements, etc.

The crude sketch maps show that the Philippines are still largely a virgin field for the surveyor and cartographer. On the whole, Mr. Jenks' impressions of the Bontoc Igorot are very favourable. He is remarkably industrious for a primitive man, is usually faithful to his one wife, is not a drunkard or a gambler, and though his chief recreation is head-hunting, it is not the passion with him that it is with many Malay peoples. The school boys are quick and bright, and Mr. Jenks believes in the future development of these people, who are decidedly friendly to the American, who are willing to learn, and whose institutions are not radically opposed to modern civilization.

New Voyages to North America. By the Baron de Lahontan. Reprinted from the English edition of 1703, with facsimiles of original title-pages, maps, and illustrations, and the addition of Introduction, Notes, and Index by Reuben Gold Thwaites. In Two Volumes. Vol. I, xciii and 407 pp., 5 Maps and 8 other Illustrations; Vol. II, vii and 386 pp., 11 Illustrations, an Appendix containing some New Voyages to Portugal and Denmark, a Dictionary of the Algonkin Language and Index. A. C. McClurg & Co., Chicago, 1905.

It is not surprising that Lahontan's volumes had great vogue in Europe and were published in its five leading languages. They appeared at the dawn of the eighteenth century, when half the New World was still white on the maps and every recital of fresh adventure and discovery only whetted the appetite for more information; and here came the narrative of a Frenchman of noble family who had long lived among these new scenes and loved them, and who had the art of telling simply what he had seen and of drawing word-pictures of the life in the wilderness and of the manners and customs of the aborigines, whose mastery in their realm was now disputed by the white invader.

Lahontan also had other qualities that gave his book a piquant and original flavour. There was no danger of mistaking it for one of the Jesuit Relations. He had a caustic wit, a gift for ridicule, and a grievance; and he called especial attention to the weak points in some of the ways and institutions of the Old World. He even found American savages superior in many respects to the Jesuit missionary and to European society. His satire was entertaining, and did not detract from the value of his keen and usually accurate descriptions of the geography, ethnology, and natural history of New France.

But all the really good material he presented came, in time, to be neglected by writers on the New World because his story of Long River and its discovery was false. There are many theories as to the reasons that may have induced Lahontan to tell this story. It need be said here only that fortune had not dealt kindly with him, and this fact partly explains, if it cannot excuse, his conduct. The penalty was severe, for he was long discredited. But many students of the early history and exploration of North America undoubtedly agree with the opinion expressed by Dr. Thwaites, that "Lahontan's work stands as one of the important sources for the intimate study of New France."

A desirable feature of the book is the Lahontan Bibliography, compiled by Mr. Victor Hugo Paltsits of the Lenox Branch of the New York Public Library. Mr. Thwaites's introduction gives so clear an insight into the character and circumstances of the author that no one need fail to read the book with intelligent interest. The notes are also copious and informing.

BULLETIN

OF THE

AMERICAN GEOGRAPHICAL SOCIETY.

Vol. XXXVII **1905.** **No. 10**

THE GEOGRAPHY OF AMERICAN CITIES.

BY

WALTER S. TOWER.

Introduction.—Students of municipal conditions generally ascribe the aggregation of population in cities to one or more of three main causes: commercial, industrial, or political activity. Thus, New York, New Orleans, Chicago, or San Francisco would be classed as commercial; Pittsburg, Fall River, or Birmingham as industrial; and Washington and many of the State capitals as political centres. In the first two classes at least, and in many cases in the last also, the cause of the growth of a city in any particular location may be traced back a step farther and find its foundation in the geographical conditions which have favoured commerce, industrial activity, or political importance. In some cases the conditions have been such as to bring the city almost exclusively under one type, as the commercial importance of New Orleans; while others may in varying degree come under any one of the three classes, as Boston. There is, however, still another class of cities which are neither commercial nor industrial, nor political in character—what may be called the social centres, popular or health resorts grown up in response to pleasing geographic conditions, either climate or location, as Newport, Atlantic City, or Asheville. Among the cities of the United States examples of all classes may be found, the study of a few typical examples of which serves to bring out the conditions that may be regarded as controlling factors for each class.

Commercial Centres.—Commercial centres grow up in response to geographic conditions favouring trade and communication at points which are natural outlets from, or points of entry to, well-settled, productive areas. The means of communication may be varied—by water, on the ocean, lakes, rivers, or canals, or on land, by

railroads, wagons, or pack-trains, and it may be such as to cover both home and foreign countries or only a limited area of one country. According to the local conditions, therefore, all commercial cities might be classed under two heads—(1) centres of foreign commerce, ocean ports, and some river ports; and (2) centres of domestic commerce, lake, canal and most river ports, and railroad cities. With hardly a single exception all the great commercial centres of both classes, in the United States, are located on bodies of navigable water, while those so situated as to enjoy ocean commerce are, as a rule, the most important. Chicago and St. Louis are the notable exceptions.

The natural conditions favouring the growth of important centres of foreign commerce are uniform throughout the country; a good harbour with a natural or easily-improved deep channel, safe anchorage, and shores of such a character as to facilitate the construction of docks and the handling of freight. At the present time the question of railroad facilities on the water front is an important consideration in the establishment of new, or the improvement of old, ports. But harbourage alone is not enough; the port must also lie near a wide extent of productive country with good routes of travel, either rivers and canals or railroads, by which goods for export may be collected, and goods imported may be distributed throughout the region. New York is a good example; for, with an excellent natural harbour and many miles of water front, her commercial superiority over the other Atlantic cities dates only from the completion of the Erie Canal, by which cheap and ready communication was afforded with the productive areas of the central West through the natural gateway along the Mohawk Valley. The other ports—Boston, Philadelphia, and Baltimore—up to that time the commercial rivals of New York, all possessed good harbour facilities, but, with no Mohawk valleys to be improved for their benefit, soon fell behind. The importance of river communication is illustrated in the case of New Orleans, which benefited by the vast area reached by the navigable courses of the Mississippi and its tributaries, and ranked as the first port in the country until the development of the trunk line railroads about 1870. For the railroads, with other conditions equal, the shortest route through the most populous country was the best. It was only natural, then, that New York, with its easy route through the Mohawk Valley and down the Hudson, with a better harbour, located several hundred miles nearer the important markets of western Europe, and already the greatest port on the Atlantic coast, should gain the supremacy.

Through a fortunate combination of geographic conditions the coasts of the United States are particularly adapted to a great ocean commerce, there being many good natural harbours suitable for commercial centres, with but relatively little expense in improvement. The main factor in producing the harbours has been a depression of the coastal areas by which the mouths of the rivers and the lower parts of their valleys have been entered or embayed by the sea. The drowned rivers have made good ship channels for entrance; the projecting headlands, made by the unsubmerged inter-stream uplands, have furnished the best of natural breakwaters to protect the shipping from storms; and the region about the depressed areas is in most cases well suited for the growth of a large city. Another factor which has favoured the growth of the larger American ports has been the absence of lofty mountains, which would act as effective barriers to communication with the extensive productive areas of the interior.

The importance of the coastal depression may be seen in the fact that, with the single exception of New Orleans, every important port in the country owes its harbour to the presence of a drowned river; not only in the case of the Atlantic ports, where the depression has been most marked, but also on the Gulf and Pacific coasts as well. Perhaps the most striking single instances are those of Philadelphia and Baltimore, which, though over 100 miles from the sea, rank as the third and fourth ports of the Atlantic coast. The position of these ports nearer to the productive West is an advantage in their favour over New York and Boston, and has furnished the ground for many of the arguments over freight differentials; but the advantage of decreased distance is offset by the absence of any easy route across the Appalachians such as is afforded by the Mohawk Valley for the east-bound traffic to New York and Boston. Of these latter two ports New York again benefits by the open valley of the Hudson River, which not only gives an easy route for the railroads but also makes the last link in the chain of water communication from as far west as Chicago, Milwaukee, and Duluth. Boston, on the other hand, otherwise most favourably located for European commerce, suffers through the presence of the Berkshire Hills, over which the railroads are obliged to ascend relatively heavy grades.

The southern Atlantic ports—Newport News, Norfolk, Savannah, and Charleston—are in varying degree hampered by the same difficulty of less ready communication with the interior. Each of the ports named lies in a region locally rich and productive, but

still relatively limited in extent by the presence of the higher hills of the Piedmont area and the Appalachian chains to the west. The southern Appalachians are also wider, in an east-west direction, than the Appalachian belt of Maryland and Pennsylvania; the ridges are higher and do not offer the advantages which Philadelphia and Baltimore possess in the lower notches of the Cumberland Gap and the transverse courses of the Ohio and Susquehanna Rivers; the high scarp of the Blue Ridge is difficult of ascent, and the higher ridges and plateau country beyond mark a region which in the absence of natural routes of travel, offers little to encourage railroad-building. The ports are therefore restricted to the tributary area of the coastal region, and are of consequently less importance.

The Gulf ports, of which New Orleans and Galveston are the chief, show not only the geographic control of location but also a control of the character of their commerce as well. New Orleans, for example, with all the great area of the central and southwest States tributary to her as a port down the natural highways of the Mississippi and its side valleys, ranks as the second export port of the country, with almost one-fourth as much in value as New York; but in the amount of imports she is far behind, with only one-twentieth as much as New York. The same condition is found at Galveston, which exports one-sixth as much as New York but imports hardly one five-hundredth as much. These conditions may be explained in great part by the fact that the two ports draw large quantities of cotton and wheat and other food stuffs from the region round about for export, while the articles of import, the necessities of life, must come by the shorter, quicker overland routes.

On the Pacific coast, San Francisco, Portland, and the Puget Sound ports are limited in the extent of their tributary area as were the southern Atlantic ports. They are the natural outlets for the entire west-going or Pacific trade of the country, but the wide, unproductive area of the American Desert, and the intervening barriers of the Rocky Mountains, the Sierras, and the Cascade Range, have necessarily restricted the extent of the area directly tributary to them. The geographical conditions, coupled with the fact that the demands of their Asiatic trade are less than those of the countries of western Europe, readily explain why the Atlantic ports are in comparison of so much more importance. With the completion of the Panama Canal it seems probable that the Pacific ports will be even less important. New Orleans and Galveston, as the natural Gulf outlets of the productive interior, must certainly

take the Pacific-going traffic of the States east of the Rocky Mountains, except, perhaps, the far northern ones, thus restricting the activities of the Pacific ports more and more to the region west of the mountains.

The greatest inland commercial centres have also been stimulated by their water traffic; they include the cities ranged along the Great Lakes, and several river cities, as St. Louis, Pittsburg, and Cincinnati. The Lake ports are interesting from the fact that their trade has often been almost entirely in the shipment of one, or perhaps two, classes of goods. Duluth and several smaller Lake Superior ports, for example, have grown up with the development of the iron mines and the shipment of ore to the mills of the eastern States. Chicago and Milwaukee are the greatest grain and flour shipping points. And the Lake Erie cities receive the products from the western lake ports and send back principally coal from the near-by Pennsylvania and Ohio fields. All of these lake ports are also railroad centres, into which converging lines act as feeders from the country round about. The importance of the lake traffic may be seen in the fact that at the time the Pennsylvania Railroad was projected the suggestion to run a line from the west to the Atlantic coast without touching the Lakes would, it was held, if carried out, mean the failure of the scheme. Up to that time every railroad between the east and the west had a lake terminus. The growth of the Lake ports is therefore due partly to the favourable conditions of water transportation, and partly to the extent of productive country acting as a feeder to their trade. The fact may be made clearer by contrasting the conditions on the American and Canadian sides of the Lakes. The one is thickly settled, with great natural resources in iron ores, agriculture and coals, with large cities and flourishing industries. The other, just as rich in ores but almost a trackless forest, has only a scanty population and a single large city, Toronto.

Of the river ports St. Louis received an important impetus from its location on the Mississippi in the days when river navigation was at its height. Pittsburg ranks as a commercial centre because of its position at the confluence of the Allegheny and Monongahela Rivers making it the natural gateway to the West. The advantage of such a location is evident from the fact that the total annual tonnage of Pittsburg's commerce exceeds that of the Suez Canal. Cincinnati, Memphis, Vicksburg, Kansas City, Dubuque, and others have in like manner been stimulated in their growth through the advantage of inland navigation.

Industrial Centres.—Many of the seaport cities which rank pre-eminently as commercial centres are also important as industrial centres, as a logical result of the fact that the mere location and established ready communication are highly favourable, not only for the supply of raw material but also for the easy marketing of the finished product both at home and abroad. New York furnishes a good example, ranking not only as the first port but also as the most important manufacturing city of the country; Chicago, the largest of the domestic commercial centres, is the second largest industrial centre, and Philadelphia, the third port, ranks third in industry. Inland commercial centres are often largely so because of their industrial importance. But there is still a class of cities which is quite distinctly industrial as the result of the geographic conditions. They separate themselves into two classes—(1) those which grow up in response to natural resources for power, and (2) those which grow up in response to proximity to raw materials. Most of the New England cities are of the first class; Birmingham, Pittsburg, and mining cities in general are of the second class.

Probably nowhere else in the country is the influence that natural power has exerted over industrial growth so marked as in the New England States. Over a region drained by several maturely-developed river systems heavy glaciation served to interrupt seriously the organized drainage, leaving in its place an abundance of waterfalls and lakes and ponds from which the rivers flowed in diverted, steepened courses. Along these courses water-power was available almost everywhere, mills were located on their banks, villages sprang up about the mills, and the present cities are the result. Massachusetts alone has more cities of over 25,000 inhabitants than any other State in the Union. Some of them, as Boston, Gloucester, and New Bedford, received their impetus from their harbours and shipping; others, as Cambridge, Newton, Malden, and Somerville, must be regarded as reflections of the growth of the "Greater Boston," but of the rest Worcester is the only important one which is not located by natural water-power. The larger manufacturing cities—Fall River, Holyoke, Lowell, and Lawrence—trace their origin and a part, at least, of their present importance to the influence of their rivers. The importance of Holyoke as a manufacturing city dates from the improvement of the power afforded by the Connecticut River, which falls sixty feet in a short distance. At present the river is crossed by a dam 1,000 feet long, giving the most valuable power in New England. At Fall River the river of the same name, the outlet of Watuppa Pond, with a fall of over 100

feet in a half mile, furnished the water-power which gave the first impetus in developing this greatest of American textile centres. Manchester, the largest city in New Hampshire, has grown up beside the famous Amoskeag Falls of the Merrimac River; Franklin utilizes the same waters higher up stream; while Nashua, Lowell, and Lawrence benefit from them farther down. The cases mentioned are but a few of the many scattered over the region from Maine southward to Long Island Sound in which the guiding influence has been the rivers and their available power.

In Pennsylvania, which ranks next to Massachusetts in the number of large cities, the contrast is marked. The streams are no less abundant, but the glaciation over the State was unimportant in its effects on the drainage. The entire southern part of the State was unglaciated, and only in the northeast and northwest corner of the State was there any approach to the condition of diverted stream-courses, lakes, and waterfalls seen in New England. Easily available power, therefore, could not be the controlling factor; it came through the maturely-developed drainage, which made possible the building of canals along the easy grades of the river valleys and the canalizing of some of the rivers themselves. In the early part of the last century the whole of the more populous part of the State was fairly well covered by the canal system. The effect of the canals can be seen in the fact that, with the exception of the ports of Philadelphia and Erie, and Chester on the Delaware River, only two of the present important cities, Lancaster and York, were not touched either by canals or canalized rivers. The cause of their growth is clearly enough in the facilities that the water transportation gave for bringing in the raw material and taking out the manufactured product before the advent of the railroad. Later on, when the railroads were introduced, the first lines parallelled the canals to a large extent, in order to share in the already-established traffic; and hence when the canals were entirely replaced by railroads the cities were not deprived of their transportation facilities.

The conditions in New York have been largely analogous to those in Pennsylvania. A great chain of important cities has grown up along the line of inland navigation which may be said to begin at Buffalo and end at New York. Rochester, Syracuse, Utica, Schenectady, Troy, and Albany complete a chain which can be equalled nowhere else in the country. Of the three other large industrial cities in the State, two—Auburn and Binghamton—have excellent water-power. The former, on the outlet of Owasco Lake, derives its power from the river, which has a fall of 160 feet in the

city limits; and the latter gets its power from the Chenango River at its junction with the north branch of the Susquehanna. The third of the cities, Elmira, not only has valuable power derived from Newtown Creek, but is also connected by the Chemung Canal to Seneca Lake and thence to the Erie Canal, and ranks as one of the most important manufacturing cities in the State.

In the western States the growth of the cities has been more recent than along the Atlantic coast. Many of the largest are located along the Lake shores and on the rivers of the Mississippi system, but most of them have been greatly helped by the rapid development and extension of the railroads. In their industrial development water-power has played little part in most cases, partly because geographic processes have made the water-power of the region slight in comparison with the east, and partly because their growth has been largely in the era of steam, to develop which many of them were readily supplied with fuel from the coal fields of Ohio, Indiana, and Illinois. Minneapolis and St. Paul are two notable exceptions. Located as they are in the heart of the grain-producing country, the immense power furnished by the celebrated Falls of St. Anthony in the Mississippi River has made them the greatest of American milling centres.

Industrial centres which have grown up in response to the presence of natural resources of raw material often present the aspect of cities where from other conditions alone no such growth could be expected. Wilkesbarre and Scranton are good examples. Before the discovery of coal and its use in the iron and steel industries the valley where the two cities now stand was a rich, fertile region devoted almost entirely to agriculture and grazing. The location of the valley between the ridges and the plateau belt of the Appalachian chain, the rugged character of the surrounding country, and the difficulty of communication with the outside world were all against the growth of a populous community. But the unlimited supply of fuel from the rich coal beds altered all this, and the populous mining and manufacturing centres are the result. Pittsburg in any case would have been a good site for a city, since its location alone at the confluence of two large rivers would make it the natural centre of traffic along their valleys. But it is certain that without the near-by coal, gas, and oil fields it would never have reached its present importance. As illustrative of this point an old tradition in the region about the mouth of the Juniata River is interesting. As the story goes, the first settler in the region, a very sagacious person, took up a strip of land commanding the junction of the

Juniata and Susquehanna Rivers, that he might profit from the city which he expected would spring up there. He also did the same thing at the junction of the Allegheny and Monongahela; but this latter tract he sold afterwards because "it was too far West." The one was in a country affording only limited agricultural resources, and is still farm land; the other is in the heart of Pittsburg.

Birmingham, Alabama, with its combination of iron ore and coal in the same region, a natural iron and steel centre; Joplin, Missouri, with its rich deposits of lead and zinc ores; Leadville and Cripple Creek, Colorado; and Butte, Montana, are the types of a large number of smaller cities and towns which have grown up solely because of the wealth of the adjacent mines.

Political Centres.—Political centres are often the direct result of geographical influences, because geography controls both distribution of population and facility of travel; and in the location of the political centre accessibility for the majority of the population is the deciding factor. Few cities, however, may be said to be purely political in character; for even though originally laid out with that purpose in view, the mere aggregation of population that must result is almost sure to attract both commercial and industrial enterprises. In the selection of political centres in the different States the control of geographical conditions is often marked. In a region with uniform surface features, and consequently more or less even distribution of population and equal facilities of travel, the political centre tends toward the geographical centre. Many of the western States are illustrative, as Columbus (Ohio), Indianapolis, Little Rock, Pierre (North Dakota), and others. But where the geographical conditions have been such as to restrict the mass of the population either permanently or for a time, little regard has been paid to the question of the geographical centre. Examples may be found among the Atlantic States where the hilly or mountainous character to the west held the people for many years to the more open, narrow strip along the coast, and where still the greater part of the population is located. Boston, Augusta (Maine), Annapolis, Richmond (Virginia), and Harrisburg (Pennsylvania) are all good examples. Farther to the south, where the coastal area is somewhat wider, the political centres are found nearer the geographical centres.

West of the Mississippi River, where climatic conditions as controlled by geography have made the region west of the 100th meridian suitable only for the support of scattered communities engaged in grazing, the mass of the population and the political centres are in the eastern part of the States. Lincoln (Nebraska) and Topeka

(Kansas) are the best examples. Montana presents another condition, with her capital in the western part of the State in the mountains, because the majority of the people are centred about the mining industry. Nevada and Wyoming ranking among the largest States in the Union have their capitals located each in the extreme corner of the State, but both are only simple responses to the location of the mass of the population. In Nevada nearly one-half the total population is found in a strip covering about 1-13th the total area of the State, near the centre of which strip the capital is located. In Wyoming about 52 per cent. of the population is located in the valley of the North Platte River in the extreme southeast corner of the State, because of the facilities for irrigation; and there the political centre is located. And, finally, in the Pacific States the segregation of the people along the coast to the west of the mountains and the interior deserts of the lava plains is reflected in the location of the State capitals—Salem (Oregon) and Olympia (Washington).

Social Centres and Health Resorts.—The cities here grouped under the head of popular or health resorts have been stimulated in their growth by geographic conditions which make them attractive to the tourist or beneficial to the invalid; in general, they are ocean, mountain, or natural spring resorts.

The attraction of the ocean resorts lies partly in the facilities for boating and bathing, but mainly in the daily occurrence of the cool sea-breeze. Newport and Atlantic City are typical. Newport is built on the southern end of Newport Island, with the ocean on three sides of the city. Much of the scenery round about is very attractive, the Cliff Walk, the Ocean Drive, and the excellent bathing beach being well known. The position of the city on the southern New England coast favours the bathing, because it is shut off by Cape Cod from the cold drift of the Labrador Current, which makes the waters of the region north of the cape so disagreeably cold. And the fact that the city is almost surrounded by water gives it a delightfully moderate climate, and is one of the important factors in making it the most exclusive resort in the country. Atlantic City, built on one of the sandy bars of the New Jersey coast, has a good beach with excellent bathing, and enjoys a climate so tempered by the ocean influence that it is frequented by many visitors in winter as well as in summer. Fogs are rare, and owing to the extensive areas of pine forest and dry sandy soil which lie inland from the coast, it is entirely free from the malaria which is so common in the low areas of other parts of the State. Atlantic

City may be regarded as one of the greatest of the American popular resorts; for although it has a permanent population of only 28,000, the transient summer population is estimated at not less than a quarter of a million. The resorts of southern California, where so many tourists seek to escape the northern winters, owe their attractions to the even more marked ocean control, which gives them a climate almost tropical in character.

Asheville and Colorado Springs are probably the best known of the mountain resorts. The former is located in the mountains of North Carolina at an elevation of 2,300 feet, with higher ridges, which shelter it on the north and east, while at a distance the ridges west of the French Broad River shut off the cold northwest winds and snows. This protection, together with the altitude, the dry soil, and the cool, invigorating atmosphere, gives it a climate especially favourable to persons suffering from pulmonary diseases. Colorado Springs is of much the same type; it is, however, at a greater elevation—6,000 feet, with a consequently rarer and more invigorating atmosphere, and, from its location at the eastern base of the Rocky Mountains, it has the dryness of an inland desert, and finally it enjoys the distinctly mountain feature of warm day or sun temperatures and cool shade or night temperatures, which are so important to invalids. Similar resorts, of lesser degree, benefiting from the effects of altitude and mountain conditions, are to be found all through the country, the White Mountains of New Hampshire and the Adirondacks of New York being, perhaps, the most important.

Widely scattered over the country there are regions in which geological and geographical forces have given natural mineral-bearing or "medicinal" springs, about which resorts have sprung up. Hot Springs, Arkansas, is the most prominent. The tradition makes them the much-desired Fountain of Youth, in the search for which Ponce de Leon lost his life and which de Soto later discovered, but too late to restore his health. The beneficial properties were certainly known to the Indians long before the advent of the white man, and from the original cluster of tepees and wigwams which they built have grown the present city and the Government Reservation, where thousands of visitors annually make use of the baths. In other sections of the country numerous resorts have grown up about springs boasting curative powers, as Hot Springs (Virginia), Cambridge Springs (Pennsylvania), Poland Springs (Maine), and others.

Summary.—The consideration of the geographical control over the location of cities and towns might be carried into much greater

detail—for example, to cover the growth of the better class of suburbs and residential districts on the higher lands about the larger cities; the location of the suburbs of manufacturing towns to the west of the factories, to escape the smoke; the beginning of many of the older New England towns on the flat areas of glacial sand plains; the location of a multitude of fishing towns at the heads of little bays; the building of mining towns in the valleys, sometimes with but a single street, or, again, built in the form of the letter T at the junction of two valleys; or towns at the gaps and passes across the mountains where travel must go. But the object here has been only to show with a few brief examples the chief geographic controls in the growth of the larger centres of population; the factors of ready communication developing commerce; natural power and raw materials stimulating industrial growth; and healthful conditions of location and climate creating popular and health resorts.

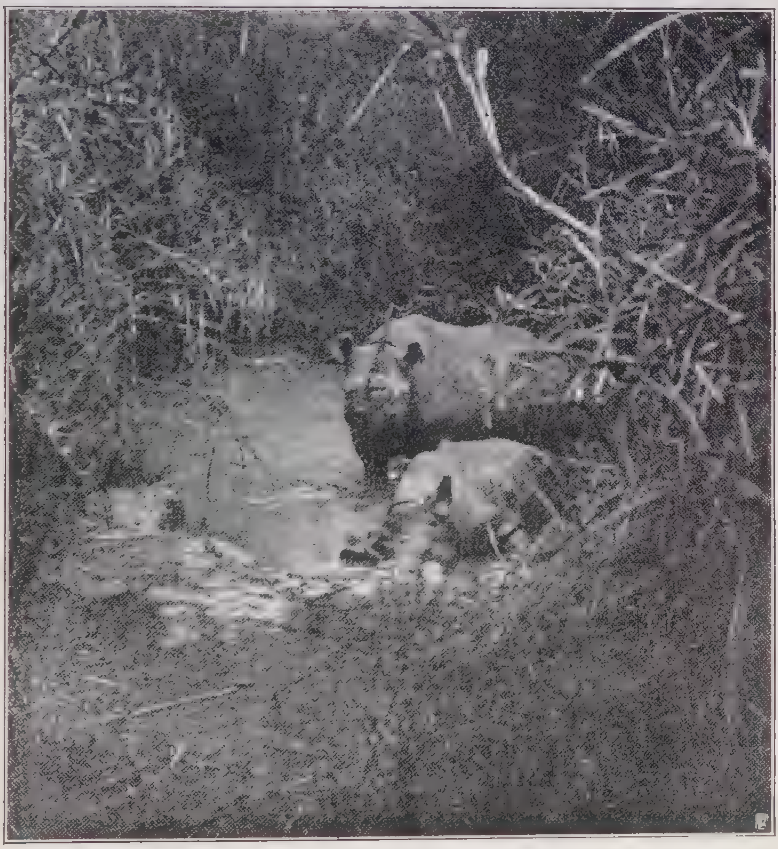
PHOTOGRAPHING WILD ANIMALS.*

The fact that 16,000 copies of this book were printed within a few months after it was sent to press indicates that the German public found in the volume, selling at about $3.00 in Germany, features commending it to unusual attention. This is true as regards both its letterpress and its illustrations. It was written by one of the most successful collectors of museum specimens of wild animal life that have ever visited Africa—a man also of attainments in biological science, if not, in all respects, of the highest authority. In its illustrations it stands alone in zoological literature, because the author is the first to use on a large scale the telescopic camera by day and flashlight by night. He shows wild animal life just as it presented itself to the camera amid natural surroundings in the forests, rivers, swamps and jungle, or on the wide plains or mountain slopes. The result is that both text and illustrations are of unusual interest, and a unique contribution to our knowledge of African wild life.

Four of the illustrations are here shown. As specimens of photography the 302 pictures are of uneven merit, many of them

* Mit Blitzlicht und Büchse. Neue Beobachtung und Erlebnisse in der wildnis inmitten der Tierwelt von Äquatorial-Ostafrika. Von C. G. Schillings. xvi and 558 pp., and 302 illustrations from photographs. (Second Edition.) R. Voigtländer, Leipzig, 1905.

being sharply defined and excellent in all respects, while others range from fair to poor. But even the poorest of these selections from about 2,000 negatives tell the truth—the characteristic facts about the animals and their environment—and this was Schillings's purpose in presenting them. He permitted the negative of only one picture in the collection to be retouched. He would have defeated his own purpose if, in order to make some of his pictures



RHINOCEROSES IN A SWAMP.

more pleasing, he had subjected them to the manipulation of an artist. It is quite safe to say that no other photographer will soon have occasion, like Schillings, to excuse the rather hazy outlines of a lion he has photographed on the ground that as he sat behind his thorn fence the animal was within ten feet of his camera—too near for a sharp definition of it.

Schillings's work in Africa was well known to his countrymen before he added the camera to his equipment on his last collecting journey in 1903–04. As the results of his three extended tours in German East Africa and the British East Africa Protectorate he has brought home a considerable number of live specimens of the big game, such as giraffes, buffaloes, rhinoceroses, elephants, and the larger antelopes, besides skins, skeletons, etc., mounting into the thousands. He has received unstinted praise for the skill and care with which he has preserved and prepared this immense amount of material so as to adapt it thoroughly for museum purposes. His collections made in 1899–1900, 1902 and 1903–04 are distributed among the zoological museums of Berlin, Stuttgart, Munich, Vienna, Frankfort-on-Main, Weimar, and Karlsruhe. He has discovered a new mouse, and new varieties of three other species: the giraffe, the hyena, and the mountain antelope, to which scientific men have given the names *Giraffa Schillingsi*, *Hyaena Schillingsi* and *Oreotragus Schillingsi*.

Impressed on his first two expeditions with the belief that most of the pictures of wild animals in popular books and text-books are more or less untrue to nature, because made chiefly from specimens in the zoological gardens or mounted in museums, he took a thorough course in field photography before his third journey, and carried to Africa a very complete equipment of cameras and other photographic material. He gave the larger part of his time during his last year and a half in tropical Africa to making this large collection of negatives.

African explorers are commenting on the truth which these illustrations seem to reveal of some of the types of topographic forms and scenery among which the animals are scattered in troops or singly. One traveller, for example, says that he has never before seen so faithful a reproduction of the real aspects of the east African plains, with their varieties of surface, their high grass, scattered trees and scrub, and the zebras, gnus, antelopes, and many other animals in their various attitudes—now peacefully grazing, now aroused to a sense of danger, here resting in the shade, there galloping over the plains, or quietly, in single file, following the paths to the drinking-places.

To mention the story that some of the telescopic photographs tell: We see the ostrich eggs hatching under the hot sun, with the mother bird on guard; elephants browsing in the thickets, and the destruction they have wrought by tearing down small trees to get at their tender twigs and leaves at the top; the bird life of the

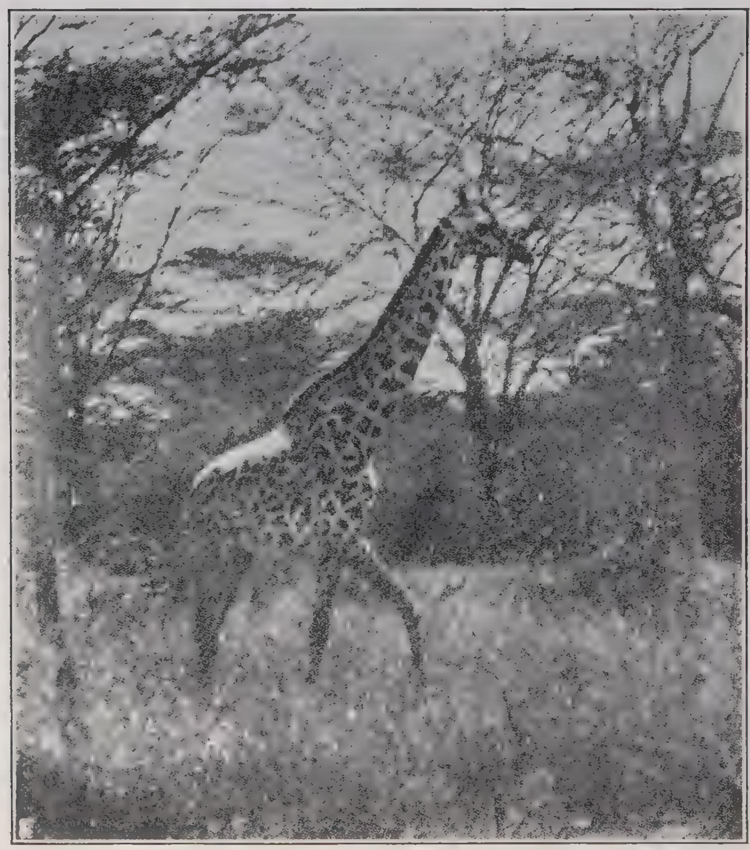
swamps; flocks pluming themselves just before starting from the neighbourhood of the equator for their winter resorts on the Mediterranean shores of Europe; rhinoceroses taking their bath or resting in the shade under the noonday sun; a hippopotamus swimming in a river; a troop of monkeys on the plain (for some monkeys are not wholly arboreal); zebras under many conditions of their lives, and the wonderful mimicry of nature, displayed in the

DWARF GAZELLES (FLASH LIGHT).

stripes and spots of some animals, making it difficult to discern them amid the vegetation that environs them.

The night vigils of the photographer were numerous and long. His camera was usually erected at the drinking-places or the paths leading to them, and here most of his remarkable pictures of lions, leopards, and other beasts of prey were taken. Sometimes he tied

to a stake or tree a donkey or steer from his camp as a tempting bait for lions; but, he says, in every instance the poor victim had been infected with the poisonous bite of the tsetse fly, and was doomed to die after lingering a few weeks in great suffering, while the death that the lion or leopard inflicts is practically instantaneous. He says that the lion springs upon the neck of his victim, and with one bite severs the vertebræ, causing instant



THE GIRAFFE.

and painless death. The long waits for photographic subjects were sometimes very trying, but Schillings says there was very little danger. All animals, from the king of beasts to the timid gazelle, were simply overcome with terror when the dazzling light flashed. They made off into the jungle at top speed. Of two flashlights taken in quick succession, one shows a lion

crouching for a spring, and the other the end of his tail as he leaves the scene.

The letterpress was written from the fulness of the author's

ZEBRAS AND GNU'S. OFTEN SEEN TOGETHER AND FRIENDLY.

long experience, his love of the animal kingdom, and his exceptional aptitude for the study of it. He says it was far easier to

endure those weary watches in the jungle from dusk to the short twilight of morning than to write his book, but there is no suggestion of effort in the interesting pages in which he tells of the life and habits of many African animals as he has studied them year after year in their native wilds. He believes all the big game animals, as well as the beasts of prey, are doomed to destruction. The game laws have diminished the slaughter by European Nimrods, but it still goes on almost without abatement at the hands of native caravans and tribes, now armed with flint-locks, in wide regions that are still only nominally under the control of colonial law.

The book concludes with lists of the mammalia and other animals collected in Africa by this untiring and enthusiastic naturalist. They include 470 species and varieties. Schillings's book is one of the most conspicuous contributions to African literature in recent years.

PEARY ARCTIC CLUB EXPEDITION, SUMMER OF 1905.

The Peary Arctic Club Steamer *Roosevelt* steamed away from the pier at North Sydney at 2 P. M. of Wednesday, July 26th. Some 43 tons of coal in bags were carried on the quarter deck to balance the weight of coal in the hold, and to keep her stern down. With this exception the decks were unusually clear as compared with previous expeditions. A few miscellaneous casks filled with water and the cases of oil were practically everything not under cover. The *Roosevelt* carried in all something over 500 tons of coal, in addition to supplies and equipment. In carrying capacity she comes fully up to my expectations. A quarter of beef in the rigging, and half a dozen live sheep on the deck aft, insure us a fresh meat supply until we strike the Arctic game. There is a large tank and several casks full of water on deck, besides the full tanks below. I hope to make no stops before reaching Cape York. The season is late and every day is precious.

In the evening we ran into dense fog through which we ploughed our way across Cabot Strait, the southern gateway of the Gulf, blowing our whistle as if in Long Island Sound, for we were crossing the track of all inward and outward bound traffic. During the night we drove through several thunder storms, with electrical accompaniments as vivid as in the Gulf Stream storms. During the following day we passed Cape Anguille and Red Island, the bold cliffs of St. George on the Newfoundland west coast.

We reached the southern entrance of Belle Isle Strait Friday evening, the fog shutting down on us and giving us a very dirty night through this graveyard of ships.

Point Amour Light was invisible until apparently hanging over our mast head, and then we felt our way along from fog horn to fog horn. We could hear two or three large steamers blowing their double blasts to show that they were lying to, and the numbers of icebergs added to the uncertainty and anxiety of the passage.

At breakfast time, just north of Chateau Bay, we ran out of the wall of fog into sunshine and a field of glistening icebergs.

From here we ran north just off the Labrador coast in alternate fog and sunshine to Domino Run, where the coast trends northwestward. Here I sent letters ashore, and learned that the ice was along the Labrador coast as far as Cape Harrigan.

Leaving Domino Run we entered the fog again, and the course was set northeast by east to bring us to the Greenland coast well up Davis Strait. We passed very close to several bergs until the following morning, when we were through them, the sea very smooth and the fog continuing. At noon of August 1st we were in the latitude of Cape Farewell and Cape Chidley, and about midway between them.

At 2 P. M. on the 3d an opening in the fog showed us the Sukkertoppen Islands on the starboard bow. We are now past the east coast ice without seeing a cake of it, and have had a very smooth passage across the Strait, with fog, light wind, and smooth sea.

On the 4th we crossed the Arctic Circle soon after midnight, and later steamed out of the fog into the true North Greenland summer weather, bright sunshine, dark blue sea, and the bold Greenland coast stretching north and south on the starboard hand. Not a piece of ice in shore of us, nor a berg in sight in any direction. Still later in the day we passed into a magnificent fleet of bergs, the output of Disco Bay. A little after midnight the morning of the 5th we passed Godhavn, the capital of North Greenland. Off Hare Island we passed through another fleet of bergs, the contribution of Umanak Sound to the Arctic White Squadron.

Early in the morning of the 6th we passed Sanderson's Hope, seen and named by John Davis three hundred years ago, its base just visible under the fog. From here on until midnight we had the first wind with any push to it, fresh from the southwest, true, and bringing up a sea which would have made the *Roosevelt* a bit lively had it not been for her sails, all of which were set and drawing.

Occasionally the top of a wave slopped over the port rail, but not sufficiently to cause any discomfort.

At 6 P. M. we passed the Duck Islands on our starboard beam, near enough to see with the glasses the old Whaler's Lookout on the summit. The sea and fresh breeze continued until after midnight, and every indication pointed to the existence of very unpleasant weather behind us, which we were just running ahead of.

During the night of the 6th to the 7th we crossed Melville Bay, and at 2 P. M. Cape York was visible ahead of us. At 7 P. M. we steamed past the point of the Cape, heading for the Eskimo settlement beyond. The run from the Duck Islands to Cape York was made in 25 hours without encountering fog, and without a sign of ice or ice sky.

We are now twelve days out from Sydney, and in regard to smoothness of sea, peacefulness of weather, entire absence of ice, and the scarcity of bergs, the voyage from Sydney to Cape York has been most unusual even for this season of the year.

Landing at the familiar settlement, I found four tents, and learned from the natives here that some fifteen families were located to the eastward, some on the island on the east side of Cape York Bay, and others on Meteorite Island. Among these were some of the best men of my last expedition. I told the natives to get their things ready to come on board on my return, went off to the *Roosevelt*, and steaming around the fringing barriers of grounded icebergs, which in summer invariably lie on the eastern side of the Cape, we headed eastward into Melville Bay.

Stopping off at the first settlement I told the men who paddled out to us in their kayaks like a bevy of ducks to get their things ready to move as soon as the ship came back, and then went on to Meteorite Island. On the south side of this I found four tents, three of them occupied by a tribe of men of my last expedition. When our mutual explanations of pleasure at meeting again were over, I learned from them that four other families were still deeper in the Bay, at Naglokto. Two of these are good men; but I shall not see them, as I cannot spend the time to go so far out of our way.

In an hour or two the entire population of Meteorite Island, with their dogs and all their belongings, were on board, and the *Roosevelt* headed westward again, leaving the place deserted.

At the next settlement the operation was repeated. Six families moved their tents, dogs, sledges, and all their belongings on board, and deserted their village in about three hours.

It was after breakfast when we finished at this place, and every one had been up all night.

At Cape York three men and their entire outfit were taken on board, leaving one old man with his wife and two children to hold the fort at this end of Eskimo land, and at two in the afternoon of the 8th the *Roosevelt* steamed around the Cape and headed north to join the *Erik* at North Star Bay. While passing Petowik Glacier we saw the most unusual sight, in these waters, of a steamer passing south to the westward of us. The glasses showed her to be a small schooner-rigged, yacht-like vessel. Arriving at North Star Bay soon after midnight the morning of the 9th, we learned that she was the Danish steamship *Fox*, which has been reconnoitring north of Cape York for the purpose of selecting a site for a station.

Here I transferred to the *Erik* with Marvin and Henson to make a round of the Eskimo settlements to the north with her and to hunt walrus, while the *Roosevelt* goes direct to Etah to overhaul her machinery and get ready for fighting ice. Soon after the departure of the *Roosevelt* the *Erik* got under way, and made the circuit of Wolstenholme Sound looking for walrus, but, in the absence of any ice for them to crawl out upon, we saw none. A few hours were then spent at the Saunder's Island bird cliffs, obtaining about 130 birds, and the *Erik* steamed back to North Star Bay, where I took on such of the natives as I wanted, with some thirty dogs purchased from the natives remaining, and the *Erik* steamed north for Whale Sound before midnight.

The next morning we were rounding magnificent Cape Parry into Whale Sound, and steamed eastward along the southern shore to Itabloo, where I expected to find more of my people. None were here, however, and the *Erik* turned northward across the sound to Karnah, where I felt certain to find some one. Six tents were located here beside the brawling summer river, and the men were all away to Cape Cleveland with one of the whaleboats which I gave them three years ago, hunting walrus. From the women I learned that about ten families were up the gulf at Kangerdlooksoah and that vicinity. Telling the natives here, as at the other places, to get their things in readiness to come on board when the ship returned, we steamed eastward into Inglefield Gulf. No ice was to be seen here, but there was a most unusual profusion of bergs from the great Heilprin and Melville Glaciers at the head of the Gulf. At times it looked as if there was no thoroughfare among the bergs, but a closer approach in every case showed winding pas-

sages among them, and off Kangerdlooksoah there were comparatively few.

Here, where I left my faithful people three years ago, I found now six tents, the occupants of all but one of them young and active men. The number of dogs and the goodly supply of skins which these people had, made the process of moving a little slower than at some of the other places, but everybody and everything was finally on board, leaving the place deserted which a few hours before had been enlivened by the voices of children and the barking of dogs. From Kangerdlooksoah we steamed north across the head of the gulf to Harvard Islands, on the northernmost of which were four tents. These, like the others, were embarked as soon as possible, and at half past two on the morning of the 11th the *Erik* was ready to steam down the gulf again.

The scene and the surroundings during this typical Arctic summer night were such as to be long remembered. The surface of the gulf like a placid mirror, thickly dotted in every direction with fragments of ice and icebergs of all sizes and shapes, and flanked on the east and north by the gigantic amphitheatre of the Heilprin, Tracy, and Melville Glaciers rising to the steel-blue slopes of the great ice, while northwest and west rose the warm, red-brown bluffs of Mount Daly and Adams and Josephine Peary Island, and to the south the rolling slopes of the Kangerdlooksoah deer pastures. During the remainder of the night we steamed down the gulf, and in the forenoon we were up on the walrus grounds, between Herbert Island and the north shore of the Sound.

Up to this time the weather, since arriving at Cape York, has been an uninterrupted sequence of calm and continuous sunlight, typical Arctic summer weather. Now, however, wind and fog have their turn, and, rendering it impossible to secure walrus, wasted the day for us.

In the evening we steamed back to Karnah to take on board the natives there and be in readiness to attempt the walrus again the following day. By midnight this work was completed, and as everyone was now dead tired and sleepy, the *Erik* steamed out into the middle of the Sound to drift until after breakfast of the following day, when we again steamed out to the walrus grounds, and by 9 o'clock at night had secured eighteen of the animals. Fog and rain were now coming in upon us, and we steamed into the last settlement on our list, Igludiahni, where six huts were found. Our stay was short, as I wanted but one family here, and it did not take me long to purchase a number of additional dogs.

When the last dog was on board, the *Erik* headed for Cape Chalon on her way to rejoin the *Roosevelt* at Etah, where she arrived at breakfast time Sunday, the 13th. The *Roosevelt* had landed her coal in bags, and the supplies had been broken out and reloaded in order to give her the proper trim to enter the ice.

It being Sunday, everybody enjoyed a much-needed rest, except the Eskimos, to whom the work of skinning and cutting up the walrus was a labor of love and pleasure.

Early Monday morning the *Erik* veered alongside the *Roosevelt*, and at 5 o'clock the work of transferring the meat, of re-storing the *Roosevelt's* supplies, and of filling her bunkers and between-deck space with coal from the *Erik* was commenced. This continued during Monday, Tuesday, and Wednesday, when the *Roosevelt* was ready to steam out and begin the struggle for which she was built, the fight with the Arctic ice from Cape Sabine to the northern shore of Grant Land. Thus far the voyage has been child's play; what is now before her is likely to be the reverse.

The *Roosevelt* has on board a crew of 20, some 40 Eskimos, and about 200 dogs. She also carries, in addition to the supplies and equipment for the party, some 450 tons of coal and several tons of walrus meat.

I have been agreeably surprised to find the natives in an unusually prosperous condition, with a superfluity of dogs, abundance of meat, and a good supply of skins for clothing. Several of my old friends and acquaintances have died during the last three years, but there are also a number of new babies, and although I have not had time for anything in the nature of a census, I have no doubt the number of births equals and probably exceeds the number of deaths. Temperature observations of air and sea water, and barograph and thermograph sheets since leaving Belle Isle are appended. These are not as continuous as might be desired, owing to the interruptions from the demands of imperative work; but they are sufficient, perhaps, to give an idea of the weather conditions thus far. R. E. Peary, U.S.N.

Etah, North Greenland,*
August 16, 1905.

* Mr. Peary's report was received September 18. The latest news brought back by the *Eric* was very encouraging. A few hours after the *Roosevelt* started for the entrance to Smith Sound it was apparent that leads in the ice were opening to the north. On the following day the vessel had passed out of sight, no smoke was to be seen, and it was evident that the openings in the ice had enabled the explorer to push into Smith Sound, and that he was making the most of the opportunity to get north as fast as the conditions would permit.

BAROMETRIC AND THERMOMETRIC READINGS, FROM SYDNEY, C. B., TO ETAH, N. GREENLAND.

Ross C. Marvin, *Observer.*

	Sea Water.	Maximum for 24 hours previous.	Minimum for 24 hours previous.	Hygrometer		Spirit Thermometer.	Barometer.	Attached Thermometer.	Commander's Barometer.	Attached Thermometer.
				Wet Bulb.	Dry Bulb.					
July 27, 9 P.M.							30.02	69		
July 28, 7 A.M.							30.02	75		
Noon	56.5						30.05	75	30.04	70
2 P.M.							30.04	76		
9 P.M.							30.02	71		
July 29, 7 A.M.							30.00	64		
Noon	40.5						29.97	65	29.96	67
2 P.M.							29.98	66		
9 P.M.							29.99	64		
July 30, 7 A.M.							30.02	64		
Noon	43.5						30.05	68	30.06	70
2 P.M.							30.05	68		
9 P.M.				70.0	70.5		30.06	65		
July 31, 7 A.M.				65.0	65.5		30.05	64		
Noon	48.0						30.06	67	30.08	72
2 P.M.				45.5	45.5	46.	30.07	64		
9 P.M.				44.0	44.0	44.5	30.09	60		
Aug. 1, 7 A.M.		56.	42.	52.5	52.5	53.	30.12	71		
Noon	47.			46.5	47.	46.	30.12	61	30.14	69.
2 P.M.				47.	47.	47.	30.13	64		
9 P.M.				43.5	44.	44.5	30.15	60		
Aug. 2, 7 A.M.		53.	38.5	45.	45.5	45.	30.21	70		
Noon	47.			47.5	47.5	48.	30.24	78	30.20	67
2 P.M.				47.5	48.	48.	30.23	79		
9 P.M.				45.5	46.	45.5	30.18	79		
Aug 3, 7 A.M.		51.	35.5	45.	45.5	46.	30.13	82		
Noon	43.			47.5	47.5	46.5	30.07	73	30.03	64
2 P.M.				48.	48.	48.	30.06	72		
9 P.M.				40.5	40.5	40.	30.01	71		
Aug. 4, 7 A.M.		50.5	35.5	47.	47.	45.5	30.01	78		
Noon	41.			45.5	46.	45.5	30.05	84	29.99	66
2 P.M.				43.	43.	42.	30.04	81		
9 P.M.				42.5	42.5	42.	30.05	87		
Aug. 5, 7 A.M.		51.	29.5	48.	48.	47.5	30.02	67		
Noon	41.			42.	42.	41.	29.98	56	29.99	65
2 P.M.				44.5	44.5	41.	30.03	65		
9 P.M.				42.5	43.	41.5	30.18	82		
Aug. 6, 7 A.M.		51.5	37.5	42.	42.5	41.5	30.25	77		
Noon	41.5			42.	42.5	41.5	30.20	61	30.19	62
2 P.M.				42.	42.	41.	30.26	78		
9 P.M.				47.	47.5	46.5	30.22	58		
Aug. 7, 7 A.M.		46.	24.	39.5	39.5	39.	30.22	69		
Noon	40.5			42.	42.	41.	30.15	66	30.14	62
2 P.M.				40.5	40.5	40.	30.14	72		
9 P.M.				37.	37.	36.5	30.02	67		
Aug. 8, 7 A.M.		46.	32.	42.	42.5	42.5	30.05	71		
Noon	36.			40.	41.	41.5	30.12	73	30.10	65
2 P.M.				40.5	40.5	39.5	30.12	72		
9 P.M.				38.5	39.	38.5	30.11	80		
Aug. 9, 7 A.M.		49.5	34.5	41.5	42.	40.5	29 76	75		
Aug. 13, Noon	37.	58.	33.	39.5	40.	39.	29.93	62	29.92	60
2 P.M.				39.5	39.5	38.	29.94	64		
9 P.M.				38.	38.	37.5	29.95	70		
Aug. 14, 7 A.M.		45.5	37.	38.5	39.	38.	29.98	67		
Noon	37.			39.	39.	39.	30.00	71	29.96	58
2 P.M.				40.	40.5	40.	30.04	76		
9 P.M.				38.5	39.	38.5	29.96	66		
Aug 15, 7 A.M.		45.5	32.5	37.	37.5	37.	29.82	65		
Noon	37.5			41.5	42.	41.5	29.80	66	29.79	59
2 P.M.				41.	41.5	41.	29.80	69		
9 P.M.				40.	40.	39.5	29.79	61		
Aug. 16, 7 A.M.		47.	37.	42.5	43.	43.	29.88	73		
Noon	37.5			37.5	37.5	37.	29.88	68	29.89	66
2 P.M.				38.	38.	38.	29.89	66		

GEOGRAPHICAL RECORD.

AFRICA.

Irrigation in Cape Colony.—The Director of Irrigation in the Cape of Good Hope Government made a journey through a part of the semi-arid northwestern districts of the colony in June and July, last year, and has sent the printed results of his inquiry to the Society. The problem is to make the best utilization of the waters to fertilize parts of this dry region. The journey was chiefly in the eastern half of the region between the Cape railroad to Kimberley and the Orange River. The available water will suffice to irrigate only a small part of the total area, but in the aggregate a great deal of land may be reclaimed to the highest fertility. The Brak River, for example, may be diverted over 5,000 acres of excellent land on Tigerpoort Vlei. The long stretch of islands in the Orange River between Upington and the Augrabies Falls comprise a large area of very fertile soil and offer the best prospect of utilizing the waters of the river on an extensive scale. In many of the smaller valleys the stock farmers may grow sufficient fruit, vegetables, and grain for their families and hired help by building dams or sinking wells. The Doorn River may be utilized to irrigate about 5,000 acres. The irrigation projects in Cape Colony are an interesting feature of the movement in many parts of the world to reclaim as large a portion of the arid regions as the water resources will permit.

Surveys in Uganda.—Lieutenant-Colonel J. H. Sadler recently read a paper before the Royal Colonial Institute (*Proc.*, 1904-5), in which he said that the work of preparing an accurate map of Uganda and of definitely fixing the areas of the estates allotted to the chiefs and landholders is being carried on by a Survey Department that has been raised to a complement of twelve English and nine Indian surveyors. Up to the end of March, last year, 7,000 square miles had been prepared by plane tabling for main and secondary triangulation; observations with the 10-inch theodolite had been taken over an area of 2,465 square miles, and 450 square miles had been mapped on the 1-inch scale.

Nile Basin Rains.—Captain H. G. Lyons, Director-General of the Survey Department of Egypt, has recently published a report on *The Rains of the Nile Basin in 1904* (Cairo, 1905. 8vo. Pp. 25), in which the results obtained at more than forty rainfall stations are discussed. Five years ago there were only six or eight places in the Nile basin where regular observations of rainfall were made. Thirty-two of the present stations are south of Berber (lat. 18° N.). Yet, with all this increase in the available material, there is still much that is not understood as regards the conditions which govern the rainfall of the Nile Basin, and as regards the relation between the rainfall in different parts of the basin. The seasonal variation of the rainfall depends, in the Nile Basin, upon the migration of the equatorial belt of low pressure, clouds and rain, and upon the conditions of the northeast and southeast trade winds. These winds, non-rainy when blowing horizontally, may give heavy precipitation when forced to rise over mountains. The maximum rainfall season is in summer, when the low-pressure belt is north. The winter rains, from November to February, do not affect the Nile supply, being purely local in their effects. They occur on the Red Sea hills, outside of the Nile

Basin, and on the Mediterranean coast; but these latter rains are mainly of importance for the crops raised on the coast west of Alexandria. The northern stations have a single rainy season, while the equatorial stations have two rainy seasons and two dry seasons. The line of demarcation between these two seems to be somewhat north of Wadelai. There are also signs of it in the observations at Nimule and Gondokoro. The rainfall in these districts falls characteristically in heavy downpours, usually as a thunderstorm, so that places near together may have annual rainfalls which differ greatly in amount. An analysis of the rainfall data for the past year shows that the rains of 1904 were generally below the mean. There was some improvement in the conditions in Abyssinia in July, but there followed a large deficiency in August, which seriously affected the volume of the Nile flood. No more favourable conditions followed, and therefore the low stage of the river was lower than usual. The high mean level of the equatorial lakes was maintained chiefly because of the fact that the meteorological conditions of July and August were less favourable than usual to evaporation. The rainfall in that district, which was somewhat deficient in the early part of the year, was above the mean in the autumn.

Captain Lyons, whose investigations in connection with the climatology of Egypt and of the Nile Basin are noteworthy, has further recently communicated to the Royal Society the results of an inquiry into the relation of the Nile flood to the variations of pressure in northeastern Africa (*Proc. Roy Soc.*, Vol. A76, 1905, pp. 66-86). He finds that the curve of the Nile flood varies inversely as the mean pressure of the summer. High and low pressures accompany low and high floods respectively. The pressure variations are generally of the Lockyer "Indian type" or the Bigelow "direct type." Pressure above or below the normal in the rainy months of Abyssinia coincides closely with deficiency or excess of rainfall. Between 1869 and 1903, on this basis, an accurate forecast of the flood could have been made from month to month in six years out of seven. On the same basis, Captain Lyons says:

> With weak summer rains and high-pressure conditions in September and the first part of October no large amount of water can have been stored up in the soil of Abyssinia, so that the springs will run off early, and a very low stage may be expected in 1905.

R. DeC. W.

Farming in British East Africa.—Two years ago there were only six European farmers in the British East Africa Protectorate, but, according to the latest official reports (*Africa*, No. 4, 1905), they now number about 600. The Director of Agriculture is continuing his experiments on the Nairobi and Naivasha farms, and his report is illustrated by photographs showing the work on these farms. The greater rains occur from March to May, when grain is sown, and crops ripen in the dry months from June to October. The typically tropical region, a coast-belt 100 miles wide, hitherto neglected on account of its climate, is now receiving attention, and about 100 acres are planted with cotton, which should yield 300 to 400 pounds of lint to the acre. There are excellent opportunities for fruit farms and dairying in the neighbourhood of the port of Mombasa. There is important development in the central districts from 100 to 250 miles inland, where settlers from the East Indies are making much progress, and their cotton crop is estimated to yield about 1,400 pounds to the acre. Many Europeans have settled in the lake district, where the fertility of the soil and abundance of rain afford excellent agricultural opportunities. The development of farming is proceeding at a fair pace in the best parts of the Protectorate, though not yet well represented in the exports.

Sir Harry Johnston's Observations in Liberia.—This African explorer made his third visit to the coast of Liberia in 1904, his earlier sojourns in that country having been in 1882 and 1885. In a paper describing his visit (*Geog. Jour.*, Aug., 1905) he says that in many places the heavy forest which grew down to the sea in 1882 has been cleared away to make room for plantations or settlements. He estimates that of the 45,000 square miles believed to be approximately the area of Liberia, 25,000 square miles are dense forest; about 15,000 square miles are the interior grass or park lands, occupied chiefly by the Mandingo cattle-raisers; about 3,500 square miles are covered with the plantations, gardens, and settlements of the Americo-Liberians along the coast; and 2,000 square miles or so are clearings made by the indigenous natives along the coast.

Rubber, he believes, is destined to be the great export product of the future, though the development thus far is very small. The wealth of the forest in rubber-yielding trees, vines, and bushes is unequalled in any other part of Africa, excepting, perhaps, in one or two small areas of the Congo Basin. There appear to be at least twenty-two trees, plants, and vines producing salable rubber, including the widespread *Landolphia owariensis* (the largest rubber resource in the Congo State), and the enormous rubber tree, *Funtumia elastica,* once so abundant in the Lagos Colony. The park-like country of hills, mountains, and grass-lands beyond the forest region is inhabited by a more or less Mohammedanized people, who genuinely, but not fanatically, adhere to Mohammedan principles. The spread of Mohammedanism in Northern and Western Liberia has been of great benefit to the country, diminishing the traffic in alcohol and checking drunkenness.

Sir Henry estimates the number of Americo-Liberians at only about 12,000; while the indigenous natives are supposed to number about 2,000,000. The immigrants from America have not, as a rule, withstood the climate much better than Europeans, and few of them have reared large families of children; but the later generation, born in the country, is taking hold of the work of development more efficiently, and this is partly due to the increasing practice—which he believes is sensible—of intermarriage with women of the fine, vigorous, indigenous races.

Americo-Liberian settlements are scattered quite thickly along all the lower part of the St. Paul's River, and some of them have a distinctly prosperous and prepossessing appearance. The part of Monrovia inhabited by the Americo-Liberians is composed of broad, grass-grown streets and substantial, well-built, comely-looking houses, churches, offices, and public buildings. The smart appearance of the houses contrasts strikingly with the neglected appearance of the roads, which were never made, but are simply unlevelled rock of more or less flat surface. He thinks the leading characteristics of the Americo-Liberians are their love of building and their remarkable politeness.

There is a good deal of civilization, with comfort and indications of progress, at the settlements that are grouped under the general name of Grand Basá, and also at the Sinó towns, the most important of which is Greenville:

> But perhaps, on the whole, the most go-ahead and energetic assemblage of Americo-Liberians is to be found at Harper (Cape Palmas). Here is a philosophical society which is doing a good work in collecting and printing statistics about Liberia. But Harper, unfortunately for Europeans, is a good deal more unhealthy than Monrovia.

Sir Harry says that the country is uncommonly free from the ordinary insect pests of Africa. There is apparently no Glossina fly to spread the tsetse disease. There are very few mosquitoes, and they seem to be entirely absent from much of the forest region. White ants are not very common or destructive in the centres of population.

There has been a marked advance in recent years in the good relations between the American settlers and their native subjects. The tribal chiefs assemble from time to time at Monrovia to confer with the authorities, and there is now no cause of dissension among them. One result of this mild rule of black by black is that the white man is everywhere received with great friendliness, because he is not associated in the minds of the natives with conquest or oppression.

AMERICA.

THE MINING AND QUARRY INDUSTRY OF NEW YORK STATE.—A report on this subject has been prepared by Assistant State Geologist Newland, and is issued as "Bulletin 93" by the New York State Museum. It presents a summary of the mineral resources of the State and their economic development. The value of the mineral production of New York in 1904 was $27,766,905, and about 10,000 workings (mines, quarries, and wells) contributed to the output. The items of largest value were: Building brick, $7,473,122; other clay products, $2,592,948; salt, $2,102,748; limestone, $2,058,405; sandstone, $1,896,697; petroleum, $1,709,770; mineral waters, $1,600,000; pottery, $1,438,634; iron ore, $1,328,894; Portland cement, $1,245,778; and natural rock cement, $1,207,883. All the various industries are described, and a full index facilitates reference. The Economic and Geologic Map of the State, issued as part of Museum Bulletin 15, and also in the 48th Museum Report, will be found useful in connection with this valuable compendium.

NEW YORK HARBOUR IMPROVEMENT.—Only a little over two of the eight miles authorized by Act of Congress to be dredged in the East or Ambrose Channel have thus far been completed. It is intended by the deepening and widening of this channel to provide an entrance to the harbour 2,000 feet wide and 40 feet deep, and to shorten the present route by nearly five miles from the bar.

THE MINERAL WEALTH OF INDIANA.—The 29th Annual *Report* of the Department of Geology and Natural resources of Indiana is a volume of 888 pp., chiefly devoted to the discussion of the mineral resources and industries of the State. The value of the output of these resources has steadily increased in the past decade, for, although the State has none of the metals, the variety and value of its useful minerals are very large. The six leading mineral resources are coal, petroleum, natural gas, building stone, clay products, and Portland cement, and the increase in their value in the past decade has been $19,257,939, or 115 per cent. Adding to the value of these resources the output of hydraulic cement, lime, whetstones and grindstones, sand and lime brick, artificial stone, moulding and glass sands, and other minor natural resources, the total value of the annual output foots up $40,000,000 or more.

A quarter of a century ago Indiana was noted chiefly for her crops of maize and wheat, her droves of cattle and hogs, and her bluegrass pastures and timberlands, a fact that makes the present development of her mineral resources all the more remarkable. The larger part of the *Report* is devoted to the clays and clay industries of the State. Shale was unknown among the natural resources a dozen years ago, and the great beds of soft, thin-layered rock which occur in vast areas in the coal counties were looked upon as a nuisance that had to be removed or tunnelled through before the coal could be reached. To-day hundreds of kilns are burning these shales into sewer-pipe, conduits, paving brick, drain tile, and other articles. The *Report* gives the location, thickness, and area of the most valuable

clay deposits, indicates their fitness for the manufacture of various products, describes methods of manufacture, and gives the statistics of the various industries. There are also special reports on the natural gas and petroleum industries.

HARVARD TRAVELLERS' CLUB.—This club was organized in Boston in 1902 for the purpose of promoting intelligent travel and exploration. Professor William M. Davis is the President. The Council Report issued in May last said that the total membership was 172, an increase of 45 during the past year. It has been voted to establish a Club medal, to be given annually to the North American traveller who shall be deemed most worthy of this distinction. Regular meetings are held in Boston and Cambridge on the last Friday of the month, from October to April, excepting December.

SOME UNITED STATES MINERAL STATISTICS FOR 1904.—The value of the clay products of the United States in 1904, as reported to the United States Geological Survey, amounted to $131,023,248. Of common brick 8,665,171 thousands, valued at $51,768,558, were produced. The value of all brick and tile produced was $105,864,978, or 80.80 per cent. of the value of all the clay products. The value of the pottery was $25,158,270, or 19.20 per cent.

The total amount of coke produced was 23,621,520 short tons, valued at $46,026,183.

The salt industry yielded 22,030,002 barrels, valued at $6,021,222.

The production of crude petroleum in the United States was 117,063,421 barrels, valued at $101,170,466.

DR. ALEJANDRO RUIZ CADALSO, Professor of Geodesy and Topography in the School of Engineers and Architects in the National University of Cuba, sends a copy of his address on *The Map of Cuba,* delivered in April last.

Dr. Cadalso declares that there is no scientifically accurate map of Cuba in existence, because there has been no trigonometrical survey of the island and no comparative survey of its elevations. He describes the methods and the operations required for such surveys, and he looks forward to the day when a body of engineers trained in the School of the University shall produce the map of the Republic.

Older countries than Cuba have yet to wait for a map.

HYDRAULIC POWER FROM ANDEAN WATERS.—Mr. C. Reginald Enock is quoted by the *Bulletin* of the Bureau of American Republics (July, 1905, p. 132) concerning the undeveloped water-power in Peru on both the eastern and western slopes of the Andes. The source of this perennial water supply, he says,

> is the ice-cap above the line of perpetual snow . . . and the exceedingly heavy snow and rain storms of the high plateaus. All along this vast chain, from Ecuador to Chile, is a series of lakes, practically astride the summit of the Andes at altitudes from 12,000 to 17,000 feet above sea-level, and these lakes, with the streams to which they give rise, are the source of enormous hydraulic energy.

Thus the River Rimac, rising at an elevation of over 17,000 feet and reaching the coast at Callao only eighty miles from its starting-point, generates electricity for the railroad between Callao and Lima, and could supply constant and unlimited power over every part of its course. Similar facilities, still unutilized, are provided by many other streams all along the 1,500 miles of the Peruvian littoral.

METEOROLOGY IN MEXICO.—Señor Pastrana, Director of the Central Meteorologic-Magnetic Observatory of Mexico, prepared a monograph for the St. Louis Exposition descriptive of the meteorological work of that Republic. Although the

Central Observatory has been in existence for twenty-six years, the general meteorological service is only now being established. It is making rapid progress, and the work of the various States is being supplemented by many private persons, who are establishing observatories and stations at their own expense. The pamphlet outlines the work of the weather map and prediction service and of each of the observatories, and is accompanied by a map showing the distribution of observatories and stations, all of which, besides recording the usual weather data, are expected to observe electric, seismic, and vulcanological phenomena and river floods.

The Measurement of a Degree in Ecuador.—The French Committee in charge of the scientific features of the measurement of a degree in Ecuador has reported to the Academy of Sciences (C. R., Vol. 140, p. 998) that the completion of the work is still impeded by many difficulties. During the past year the large amount of fog in the upper region of the Andes, the bubonic plague in Ecuador, and the invalidism of several of the officers in charge have greatly hampered operations. In order to keep the cost within the sum now available, it will be necessary to shorten the length of the arc, omit the pendulum observations, and curtail operations in other ways. The report argues strongly against this impairment of the original plan, urges that every effort be made to carry out the work in its entirety, and asserts that, even after allowing for further delays, the whole undertaking should be completed by May next year.

Chilean Meteorology.—Five volumes of the *Anuario del Servicio Meteorolójico de la Direccion del Territorio Marítimo* of Chile have thus far been published, for the period 1899-1903. These publications are not widely known. They are not listed, for example, in the "*Atlas of Meteorology.*" They are of quarto size, and average between 400 and 500 pages. The marine meteorological service of Chile was under the direction of the Central Meteorological Observatory of Santiago until the year 1899, when it was transferred to the so-called Direccion del Territorio Marítimo. The observations contained in these volumes are made at stations situated on the coast of Chile, stretching from Arica in the north to the Strait of Magellan in the south, thrice daily, at 8 A. M., 2 and 9 P. M., although during the first half of 1899 the hours were 7.30 A. M., 1.30 and 9 P. M. Three times a month, on selected term days, observations were made every three hours until the year 1903. In the first volume, sixteen stations are included; in the second, fourteen; in the third and fourth, sixteen; and in the fifth, eighteen. In the volume for the year 1903, for each station which was in operation in 1902 and 1903 there is a graphic representation of the variations of the different meteorological elements during these two years. The curves for one year are in red, and for the other in black. These are the only diagrams in the five volumes. In 1903 the names, positions, and altitudes of the several stations were as follows:

STATION.	S. LAT.	W. LONG.	ALTITUDE (M).
Arica	18°28′05″	70°20′30″	5
Iquique	20°12′05″	70°11′03″	9
Antofagasta	23°38′54″	70°25′20″	4
Caldera	27°03′25″	70°52′40″	28
Isla Chañaral	29°00′50″	71°36′40″	48
Coquimbo	29°56′30″	71°21′30″	26
Valparaiso	33°01′05″	71°38′05″	41

STATION.	S. LAT.	W. LONG.	ALTITUDE (M).
Juan Fernandez	33°37′00″	78°50′00″	10
Constitucion	35°36′00″	72°38′00″	33
Talcahuano	36°36′51″	73°06′08″	91
Isla Santa Maria	36°59′05″	73°32′05″	65
E. of Isla Mocha	38°21′22″	73°58′06″	18
W. of Isla Mocha	38°22′12″	73°53′44″	32
Punta Niebla	39°52′02″	73°24′02″	43
Punta Galera	40°01′05″	73°44′02″	38
Ancud	41°51′00″	73°50′00″	48
Islote de los Evanjelistas	52°24′00″	75°06′00″	53
Punta Dungeness	52°23′55″	68°25′10″	3

It will be noted that these stations vary very little in longitude, and are all very near sea-level. This fact gives the data added interest.

While these volumes present no discussion, containing nothing beyond the tabulations and monthly and annual summaries, and while the records are not complete in some few cases, owing to illness or absence of observers, errors in or lack of instruments, and some diversity in methods of recording wind velocity, the material here collected is of very great value. Chile is in many respects the most interesting country in the world, climatologically. It has a great latitudinal extent. It ranges from aridity in the north to abundant rainfall in the south. It extends across the subtropical belt and into the belt of the prevailing westerlies of the Southern Hemisphere. It has certain striking resemblances to the climate of the Pacific coast of North America. For these and other reasons Chilean meteorological data are of peculiar value and interest, and these annual volumes of the marine meteorological service of Chile are welcome additions to the library of climatologists. R. DeC. W.

The Trans-South American Railroad.—The resumption of work on the railroad between Buenos Aires and Valparaiso is announced. The completed line will be 893 miles long, and in the Andes region it will cross elevations over 10,000 feet above sea-level. The only section not yet built is in the Chilean Andes, and is 29.76 miles in length. When this very difficult part of the road is finished only a day and a half will be required for passage between the capitals of Argentina and Chile.

Railroads in Bolivia.—The President of Bolivia has secured from Congress authorization to apply the $10,000,000 received from Brazil in the settlement of the Acre dispute to the construction of other railroads. That will not only open the way to the Amazon River by circumventing obstructions to the navigation of some of its tributaries, but will also connect the cities of La Paz, Oruro, Cochabamba, Potosi, and others. These new railroads will make some of the large mining centres much more easily accessible than at present.

ASIA.

Central Asian Cotton.—Ferghana, in Russian Central Asia, is Russia's largest source of raw cotton within her Empire. The *Board of Trade Journal* (No. 451) reports that the area under cotton in Ferghana, in 1904, was 504,900 acres, of which 467,100 acres were planted with American seed. The total harvest was 185,000 tons. The Marghilan district had the largest cotton area; but Andizhan

gave the best harvest, more than a third of the whole. Since 1900 the increased attention given to cotton-raising has stimulated irrigation and cultivation so that fertile land now brings many times its value ten years ago. The left bank of the Syr Daria for hundreds of miles will be capable of extraordinary productivity when irrigation works are developed; and in the Chimkent district alone there is said to be about 500,000 acres of good land.

Geographical Names in the Philippines.—The *Official Gazette,* published at Manila, contains, from time to time, a list of the decisions of the Philippine Committee on Geographical Names. This Committee, appointed by Civil Governor Taft, in November 1903, consists of the chiefs of the Philippine Bureaux of the Coast and Geodetic Survey, the Ethnological Survey and Public Lands, and two Philippine members. Among the decisions rendered on May 1 last were Balintang for the island and channel north of Luzon, and Subic for the bay and town on the west coast of Luzon.

Climate and Weather of Turkestan.—There is a good deal of climatological interest in the Carnegie Institution volume on *Explorations in Turkestan, with an Account of the Basin of Eastern Persia and Sistan,* by Professors Pumpelly and W. M. Davis, and Mr. Ellsworth Huntington (Washington, April, 1905). Both past and present climatic conditions receive consideration. Full confirmation has been found of the statements concerning "a progressive desiccation of the region of long standing, which has from a remote period continually converted cultivable lands into deserts and buried cities in sands" (p. 19). A view of one of these sand-buried cities is given on page 12. Abandoned sites of human occupation, large and small, and widely distributed, were discovered. A correlation of the physical and human histories is believed to be obtainable through a continuance of the investigation. The increased precipitation on the mountains of the Tian Shan as compared with the aridity of the deeper valleys, which are parched by evaporation into drying winds which descend over them, is noted (pages 71-72), and the observations of Sewerzow on the seasonable migration of the Kirghiz, with their flocks and herds, in search of vegetation at great altitudes, are confirmed by Davis. An interesting relation between insolation, vegetation, and erosion, as the result of differences of exposure, is also noted (p. 72). In the badlands of the Narin Basin (6,500-7,000 ft.) the sunny slopes were found to be bare and well dissected, while the shady slopes were smoother, and were covered by sparse herbage. On the high spurs of the Kungei Alatau (10,000 ft. and more), above the tree line, the sunny slopes were better covered with grass than the shady slopes. In the first case, sunshine promotes aridity and is hostile to vegetation; while, in the second, sunshine melts the snows, and is therefore favourable to vegetation.

Much attention is paid to oscillations of climate during recent geological times, and evidence is adduced in favour of five advances of the ice during as many glacial epochs. Between the advances there were periods of retreat almost as warm as, if not warmer than, the present climate. The climate of Persia is discussed (pp. 227-229) in connection with the characteristic physiographic forms of that country, and mention is made of the constant high and dry winds of the summer. These are very disagreeable, but have also certain useful effects. For example, in the houses of the wealthier classes an open doorway in the north (windward) side is stuffed with small brushwood, upon which a servant throws water. Evaporation then cools the air which whistles through the brush, and makes the interior of the house comfortable. If the wind fails, as it occasionally

does for a day or two, the heat within becomes insufferable. Windmills are built, often in rows of ten or twelve running east and west, in order that advantage may be taken of these summer winds. In one case fifty of these windmills were seen in one row. Because of these winds, no fruit can be raised upon trees in Sistan. The wild watermelon, under the influence of the winds, spreads its branches to the south, and they "lie in a long bunch so exactly oriented that the plants might almost serve as a compass." These prevailing winds have scooped great hollows, six or eight feet deep, in the plain, the long axis of these hollows being always directed to the north-northwest. Another curious effect is noted in the case of the sun-dried brick ruins of Sistan. When the old walls stand in a north-and-south direction—*i. e.,* parallel with the prevailing wind—they stand indefinitely, although gradually worn very thin; but when the walls stand east-and-west, they are very soon blown away, and disappear entirely (p. 229). An illustration (p. 229) shows some of these north-and-south walls standing, while there are hardly any east-and-west walls to connect them.

At the end of the Report on the Basin of Eastern Persia and Sistan, Mr. Huntington presents an interesting account of the relations of climatic changes and history in the region under discussion. He finds a striking agreement between legend, history, and physiography as regards evidence of climatic change, and after a careful investigation of the facts thus collected, he comes to the following conclusion:

> The history of Sistan, so far as it can be made out, seems to indicate a gradual desiccation of the country from early historical times down even to the present. The evidence of archæology, history, and tradition in the surrounding countries points in the same direction. At Sistan history and physiography appear to join hands, for the change from the conditions of greater water supply during antiquity to the desiccation of to-day is apparently the change from the last fluvial epoch to the present interfluvial epoch.

There is, further, much information in this Report concerning the action of wind in arid regions and concerning the climatic control of land forms, so that the volume will prove of value to the geologist, the physiographer, and the archaeologist, as well as to the climatologist.

R. DeC. W.

The Meteorology of India, 1892-1902.—The period of 1892-1902 was marked by certain peculiar features in India which were unique in their degree of development and their persistence. From 1892 to 1894 there was excessive rain. From 1895 to 1902 there was a steady and persistent deficiency of rainfall over the greater part of India. This deficiency affected certain districts to such an extent that it caused two of the most extensive and most intense famines which have ever occurred in India. Similar features to those which were noted in India extended over a very wide area, probably including the Indian Ocean and adjacent countries, as well as the greater part of Southern Asia. Concerning most of this great area, the information at hand, or obtainable, is very meagre; but Sir John Eliot, late Meteorological Reporter to the Government of India, has made an admirable—as he calls it, "preliminary"—study of the more important features of the meteorology of this territory during this remarkable period, which appears as *Indian Meteorological Memoirs,* Vol. XVI, Part II. 1905. This folio volume, comprising 354 pages, with numerous tables and curves, does not attempt to "give a satisfactory and conclusive investigation of the primary causes or actions giving rise to these abnormal features," one of its main objects being "to indicate that it is absolutely necessary, in order to ascertain the causes of these and similar large variations, to study the meteorology of the whole Indo-Oceanic field."

R. DeC. W.

Criticism of Maps of Asia Minor.—In an address on "Exploration in Asiatic Turkey" before the Royal Geographical Society (*Geog. Jour., Sept.,* 1905), Col. P. H. H. Massy said the first difficulty which confronts the traveller in Asia Minor is the want of a good map. No reliable map is available. We owe thanks to Kiepert for placing something in our hands and for the present effort gradually to correct that something; but there is much still to be noted and corrected, and it is very desirable to encourage well-equipped volunteers to go out and systematically map Asiatic Turkey by sections.

Kiepert's new sheets are somewhat involved by a mixture of ancient and modern names. This is perhaps due to the information supplied by archæologists who have lately travelled there. It would be better to keep the modern entirely separate from the ancient; also to build up a new map gradually as reliable topographical information is obtained. The map of Northeastern Asiatic Turkey, by Mr. H. F. B. Lynch, is a great advance on earlier maps, but even this excellent map fails to show some routes which Col. Massy followed.

EUROPE.

A Fortnight at the Summit of Mont Blanc.—On June 17, according to the London *Times* (weekly edition, July 28), Mr. Millochau, of the Meudon Observatory, near Paris, started for the summit of Mont Blanc with several guides and porters, provisions, and astronomical instruments. They were caught in a violent thunderstorm on the way up the mountain, and were much exhausted when, on June 20, they reached the summit. The Janssen Observatory was found in fairly good condition, and, though it was not intended for a dwelling-house, it served this purpose for Mr. Millochau and his colleague, Milan Stefanik, who lived in it from June 20 to July 3. They employed themselves taking observations, and would have prolonged their stay beyond a fortnight if provisions on the way up to them from Chamonix had not failed to arrive on account of bad weather. During the last days of their stay they were reduced to short rations.

The Routes of Bird Migration in Europe.—*Ciel et Terre* for April 15, 1905, reprints from *Chasse et Pêche* some notes on bird migration in Europe by Dr. Quinet, who has also constructed charts showing the routes followed by the birds, and has prepared synoptic maps of these migrations. The summer and winter habitats of the different birds may thus be graphically shown; the points of departure; places for obtaining food; temporary resting-places; the direction of the migrations, and the final destinations. Dr. Quinet divides Europe into three large climatic zones, as follows:

Marine Climate.—1, Western Europe, with relatively mild summers and winters; 2, The Mediterranean region, with hot summers and mild winters.

Extreme Continental Climate.—Eastern Europe, with hot summers but cold winters.

Rains.—1, Western Europe has its maximum rainfall chiefly in autumn, when the warm and moist air of the westerly winds blows over cold land surfaces; 2, Central and Eastern Europe have chiefly summer rains, when the air is moist and is well warmed over the warm surface; 3, Northern Europe, with dry summers. In this general arrangement of climates the author finds explanation of the large migrations, which he studies out in detail, classifying them in a general way by points of the compass. The laws of bird migration are considered briefly, as well as the conditions under which the different birds journey, some by night,

some at dusk or dawn, some by day, some in groups, some by individuals, etc., etc. The darkest nights do not interfere with the movements of some, but thick fog brings them all to a stop if they are flying over the land, while those which are crossing the sea lose their way or beat against lighthouses or the lights of vessels. Mountain ranges, steppes, oceans, deserts, whether of ice or of sand, are impassable barriers for most migrating birds, forcing them to seek other routes along which they may rest and find food. The Asiatic species, in their migrations, follow the same general directions as do those of Europe—namely, from northeast to southwest in autumn, and from southwest to northeast in spring. These directions Dr. Quinet finds the logical ones in view of the general distribution of climates; but they are not rigidly adhered to, and many birds of passage travel directly north and south. R. DeC. W.

The Flow of the Thames in Relation to Pressure and Rainfall Changes.—In *Nature* for June 22, 1905, Dr. W. J. S. Lockyer considers the relation of *The Thames Flow and British Pressure and Rainfall Changes.* Curves are plotted showing the Thames flow, and the rainfall and pressure (curves inverted) for a period of about forty years, with the result that there is a striking similarity in the lines. Hence Dr. Lockyer believes that any method of forecasting pressure would make it possible to determine the rainfall beforehand. He finds that in some years the British area belongs to a pressure system that extends over the region of which India is about the centre, and then in another series of years the British Isles are dominated by the antipodal pressure system of which South America is the middle portion. This complexity makes it difficult at present to forecast British pressures, but the author believes that further investigation will throw much light on the subject. R. DeC. W.

Inversions of Temperature on Ben Nevis.—Mr. Andrew Watt, of the Scottish Meteorological Society, discusses the inversions of temperature noted between the base and summit of Ben Nevis during the thirteen years, 1891-1903, in *Nature,* Vol. 71, 1905, pp. 583-584. The inversions are grouped according as the summit temperature was higher—(1) At one hour at least of the day; (2) at each of the twenty-four hours of the day; (3) in the mean of the twenty-four hours of the day. The number of cases was as follows:

	Class 1.	Class 2.	Class 3.
January	7	..	3
February	18	1	5
March	11	..	1
April	9	..	..
May	7	..	..
June	8	..	..
July	4	..	..
August	4	..	..
September	22	..	3
October	15	..	5
November	29	3	8
December	24	5	8
Year	158	9	33

It appears that inversions which continued throughout the whole twenty-four hours occurred only in February, November, and December; while those of Class 3

occurred between September and March only. The average difference of temperature between Ben Nevis and Fort William ranged from 16.8° F. in April to 14.4° in December. The mean difference for the whole year is 15.4°. Inversions at all seasons are large departures from the usual conditions. In February, 1895, at 9 A. M., on the 19th, the summit was 17.6° warmer than the base (Ben Nevis, 33.6°; Fort William, 16.0°). This is the greatest inversion recorded there. The inversion of the greatest duration was in November, 1897, when the temperature at the summit was higher than that at the base for fifty-eight consecutive hours. The mean daily temperature on November 4, 1897, was 9.7° higher on Ben Nevis than at Fort William. R. DeC. W.

The Ordnance Survey.—The annual report of the progress of this survey to March 31, 1905, shows that great advance has been made during the past year. The map, on a scale of one inch to a mile (Outline and Hill editions), has been completed for the entire United Kingdom. The coloured edition has been completed for England and Wales and begun for Scotland. About three-quarters of the coloured map of Ireland has been finished. The two-mile drawing of England and Wales has been completed, and more than half of it has been published. The Outline edition, on a four-mile scale, has been published for the whole of the United Kingdom; and county and district maps with main roads coloured have been published for the whole of Great Britain. The ten-mile map in colours has been published for Great Britain, and will soon be issued for Ireland. The map on a scale of 1:1,000,000 has been completed and published in colour for the whole of the United Kingdom. All these maps, excepting the last named, will soon be procurable, folded for the pocket. The Ordnance Survey maps are now supplied to schools at a very low price. It is hoped that this will help to improve geographical education and make the maps better known to the general public.

Cable to Iceland.—*Export* (No. 29, 1905) says that arrangements have been fully completed for laying a cable between Iceland and the Shetland and Faroe Islands. The Shetlands are already connected with mainland by cable. The new cable will extend from the Shetlands to Thorshavn on the Faroes, thence to Iceland and Scotland; thus the electric communications with the continent which Iceland has so long desired will be secured. The Great Northern Telegraph Co. has the concession for laying and operating the cable. Not only Denmark and Iceland, but also all countries that are interested in the Iceland fisheries, will profit by the cable, and the daily weather report from Iceland will be of immense service to navigators and to science. The cable will be landed on the east coast of the island, and the Government of that colony will build and maintain the land line that will connect the cable with Reykjavik.

POLAR.

Rescue of the Ziegler-Fiala Expedition.—The *Terra Nova,* which sailed for Franz Josef Land early in the summer to rescue the Ziegler North Polar Expedition, has returned with all the members on board excepting a Norwegian sailor, who had died. The Fiala party had not been heard from since it left Norway in July, 1903, until its relief by the *Terra Nova* on August 1, this year. The explorers experienced great hardships, as their vessel, the *America,* was crushed in the ice a few weeks after they reached Franz Josef Land. The fol-

lowing facts are condensed from Mr. Fiala's statement published in the London *Times* (weekly edition, Aug. 25), which gives the fullest account of the expedition yet published.

The *America*, with the expedition on board, left Vardö on July 10, 1903, and, after considerable delay among the ice fields, arrived at Cape Flora in the southern part of Franz Josef Land on August 12, where a small supply of provisions was landed. The vessel then proceeded up the British Channel to Teplitz Bay, Crown Prince Rudolf Island, the most northern harbour in Franz Josef Land. Here the base camp of the expedition was established and named Cape Abruzzi. Part of the cargo, including ponies and dogs, was landed with difficulty, as the ship was in the ice nearly a mile from the shore. A house was then constructed.

On November 21 the *America* was crushed in the ice. She did not disappear until January 22, when all the old ice was broken up, the ship sank, and also 100 tons of coal and 40 tons of provisions, which had been cached on the ice and could not be sledged to camp on account of the almost continuous storms.

In March, 1904, two parties left camp on the sea-ice for the north. Both attempts to make a high northing were failures:

> The ice conditions were frightful, and nearly every one of the sledges was hopelessly smashed, making it absolutely necessary, if the equipment was to be saved for another attempt in the following year, that the party should return to Camp Abruzzi. Though this column only reached a comparatively short distance from land, all the way had to be cut with ice axes, and it now became clear that it was useless to attempt to get further north during the spring of 1904.

The summer and fall of 1904 were spent chiefly in watching for the relief ship which, it will be remembered, was baffled by the ice and had to return to Norway. By September 10 it was realized that the party would be compelled to spend a second winter in the Arctic. Coal was discovered 600 feet up the side of a steep mountain, and it augmented the fuel supply.

The party prepared to make a spring sledge trip to the north. It was ready to leave in February, but the weather was even worse than during the previous year. The start was delayed until March 16. Very slow progress was made, as the ice was rougher than in 1904. All the sledge men had to work at cutting the trail and then return to help the dog teams over the rough road. Deep snow, numerous stretches of open water, and fog all helped to delay progress. Realizing that the record for progress north could not be beaten under such circumstances, the party returned to camp. The outlook for the relief ship was resumed, and on Sunday, July 30, the news came that the *Terra Nova*, with Mr. Champ in command, had arrived at Cape Dillon. No time was lost in getting the party together and starting southward.

The avowed purpose of both the Ziegler expeditions was to reach the north pole, or at least attain a high latitude. The second expedition seems to have been even less successful than the first, under Mr. Baldwin, for he at least succeeded in planting tons of supplies on Crown Prince Rudolf Land, near the most northern camp which the Fiala party established. This party did not succeed in getting the larger part of the supplies brought by the *America* to land. Though they had been placed on the ice within less than a mile from the shore many weeks before, they were finally engulfed in the sea. With this large supply of fresh stores lost, the Fiala party could scarcely have survived if it had not been for the dépôts which Baldwin had planted in their neighbourhood. No important scientific results of the expedition have yet been described.

Antarctic Meteorology.—Mr. R. C. Mossman, who was in charge of the

Antarctic Meteorological Station at Scotia Bay, South Orkneys, contributes to *Symons's Meteorological Magazine* for June some account of the work, and of the phenomena observed, at that station. Much trouble was experienced with the wet bulb thermometer, and at temperatures below 10° F. the muslin covering was done away with altogether, and the bulb was painted with water by use of a camel's hair brush. Most of the snow that fell was hard and granular; large flakes were rarely seen. Ice storms were frequent, and gave much trouble. Snow crystals were observed to be deposited from fog. Remarkable mirages were common, and solar and lunar halos, accompanied by mock suns or moons, with horizontal and vertical circles, were occasionally observed, but rainbows were uncommon. Colourless fog bows were noted at times, but not a single case of the aurora was seen. Neither Nordenskjöld nor Charcot, who both wintered farther south than the South Orkneys, reported any auroras. Stratus clouds were the commonest cloud-forms in summer and winter. In the former season they covered the sky for days together without a break. Cirrus clouds were seen at very low altitudes, from 6,000 to 8,000 feet above the surface. Foehn winds were noted on several days, usually in winter, and invariably blew from the W.N.W., across some high mountains. None of the curious rises of temperature during blizzards, which were reported at the winter quarters of the "Discovery" and by Nordenskjöld, were observed. The minimum temperature recorded was —40° F. The mean annual approximates 23° F. R. DeC. W.

PERSONAL.

Dr. A. J. Herbertson has been appointed Reader in Geography in the University of Oxford from October 1, to succeed Mr. H. J. Mackinder, who resigned the readership to give his whole time to the work of the London School of Economics. Dr. Herbertson is also editor of the *Geographical Teacher,* one of the authors of the Atlas of Meteorology, and in the past ten years has contributed largely to the literature of educational and other branches of geography.

Professor Guido Cora, the well-known Italian geographer, has been elected a member of the Pontificia Accademia Romana dei Nuovi Lincei of Rome.

Mr. Bailey Willis, who went to Europe in July to make certain studies under a grant of the Carnegie Institution, returned home in July.

Professor T. C. Chamberlin has been appointed a member of the Illinois Survey Board, the other members being Governor Deneen (*ex officio*) and President James of the State University.

Dr. Siegfried Passarge, Privatdocent in Geography at the University of Berlin, has accepted a call to be Professor of Geography at the University of Breslau.

GENERAL.

Bibliotheca Geographica for 1901.—Each of the annual volumes of this standard work of reference is welcomed as a library convenience of the first class. The volume for 1901 has 571 pages, and practically covers the entire literary geographical output for the year. It is gratifying to read in Editor Baschin's Preface that Vol. XI (1902) will probably be issued in less than a year after the publication of Vol. X. Little can be done to improve this useful and comprehensive bibliography excepting to fill up the rather wide gap between the year treated and the date of its publication. The work of preparing each volume is very great, and most of it devolves upon Mr. Baschin, but it is to be hoped that gradually

he may be able to bring the annual up nearer to date. This wish may be expressed, not in the way of criticism, but merely in the belief that such a consummation is to be desired as soon as it can be attained.

Mistakes are surprisingly few. It was easy, however, to make the blunder of presenting the work of two American writers named Adams and bearing the same initials as the literary output of one man.

A Bibliography of Lithuania.—Mr. Baltramaitis has prepared a list of the literature relating to Lithuania, its geography, history, law, statistics, and ethnography, including folklore. There are 8,514 titles, and the bibliography fills 614 pages in Vol. XXV of the *Memoirs* of the Russian Geographical Society. It is followed by an Appendix containing a list of 2,665 Lithuanian and old Prussian books printed from 1553 to 1903.

Exploration of Gough Island (Diego Alvarez).—This island lies in the Southern Atlantic, about 1,500 miles W. by S. of the Cape of Good Hope, with the island of Tristan da Cunha as the nearest land, 280 miles away. It is above 8 miles long and 4 miles broad, and is one of the peaks of the mid-Atlantic ridge, which probably makes its most southerly appearance above the surface of the ocean in Bouvet Island. Though it was no doubt discovered in the sixteenth century, and has been sighted or visited by a considerable number of navigators, the island remained practically unexplored until the Scottish National Antarctic Expedition landed there in April, 1904, on its way from the Antarctic to Cape Town. The visit was brief, but observations and collections were made, and the results were important, for this rock was really the only Atlantic island which was still unexplored. Mr. R. N. Rudmose Brown, one of the party, gives a description of the island, with illustrations, in the August number of the *Scottish Geographical Magazine,* and the following facts are taken from his article:

The party were pleasantly surprised to find the island beautifully clothed in green from the water's edge almost to the summit. Numerous brooks were pouring out of the hanging valleys and leaping over the sheer precipices some hundreds of feet into the sea. The island is very precipitous, and in most places rises from the sea in cliffs that are from 200 feet to nearly 1,000 feet in height near the northern end.

Above these cliffs the ground rises more gradually towards the summit, which is estimated to be 4,380 feet in height. Towards the south-west end of the island there is a more or less level plateau, about half a square mile in area, at an elevation of about 300 feet. Everywhere else the island seems to rise into steep ridges separated by narrow glens.

At the foot of many of the cliffs is a narrow strip of beach or rocks at low tide, but the interior is accessible only from a few places on the shore. At the seaward end of the glen, on the east side, is the best landing-place, and here a number of ruined huts may still be seen. A settlement here would have shelter except from the east; there is a good supply of fresh water, and about an acre of level ground might be used for raising vegetables, or even for grazing. There is really no good anchorage, for the water deepens rapidly and the holding-ground is bad.

Dr. Pirie, of the same expedition, says the island has some resemblance to Madeira in its jagged outlines and steep slopes and cliffs cut deeply by ravines; but it differs from Madeira in the height and steepness of the cliffs, which nearly everywhere come sheer down to the sea without any gradual slope. As far as is known the rocks are wholly of volcanic origin.

Twenty-three or twenty-four species of birds were recorded, of which the expedition collected nineteen. The only mammal is a mouse, introduced by earlier visitors. The vegetation is dense in most parts, and it is consequently difficult to move over the island. Thick tufts of tussock grass (*Spartina arundinacea*) grow in abundance over all the lower ground. Gnarled and stunted trees (*Phylica nitida*) grow from sea-level to almost 2,000 feet. The flora, as now known, contains 17 species of flowering plants, 10 of ferns, 10 of mosses, 3 hepatics, 7 lichens, and 1 fungus, besides several small algæ. As the island lies in the region of prevailing westerly winds, stormy weather and heavy seas are common.

A Supplement to Dr. Mill's Hints to Teachers.—Eight years ago Dr. H. R. Mill published a small book entitled "Hints to Teachers and Students on the Choice of Geographical Books for Reference and Reading." The object of the little volume was to place before teachers and students a selection of the best books on geography as an educational subject and on different parts of the world. The book has been used with great advantage both in the United Kingdom and this country; and in preparing a list supplementary to that which Dr. Mill collected Dr. A. J. Herbertson has continued and augmented the usefulness of this entire selection of text-books and works of reference that are especially useful to teachers and students. With the mention of each book in the later list are a few lines of description or characterization. Seventy-seven works, most of which have been published since 1897, are included in the parts of the supplementary list printed in *The Geographical Teacher,* No. 10, 1904, and No. 12, 1905.

The Fiftieth International Congress of Americanists will meet at Quebec from Monday, the 10th, to Saturday the 15th, of September, 1906.

The membership fee is Three Dollars (fifteen francs, twelve marks). Members are entitled to vote, to take part in the decisions, and to receive *gratis* the publications of the Congress.

Associate Members pay a fee of One Dollar (five francs, or four marks). They may attend all the general meetings, but they have no vote, and they do not receive the publications.

Payment of fees to be made by P. O. order, or by cheque negotiable at Quebec, drawn to the order of the Treasurer of the Committee of Organization, M. Alphonse Gagnon, Parliament House, Quebec.

NEW MAPS.

AFRICA.

Northeast Africa.—Four Sketch Maps. Scales, 1:12,500,000 and 1:18,000,000. By Fernand Maurette. *Annales de Géog.,* No. 76. Armand Colin, Paris, 1905.

These black-and-white maps include the triangular territory between Cape Guardafui and the Upper Nile, and between Eritrea and British East Africa. They were compiled from authoritative sources to show the present condition of our knowledge of this part of Africa in respect to its topographic relief, climate, hydrography, and distribution of vegetation. They illustrate the first part of an exhaustive study by Mr. Maurette, entitled, "État de nos Connaissances sur le Nord-Est Africain."

LIBERIA.—Sketch Map of the Republic of Liberia. Scale, 1:2,000,000, or 31.56 statute miles to an inch. The *Geog. Jour.*, London, August, 1905.

Illustrates a paper by Sir Harry Johnston on his recent visit to the negro Republic. Tints show the densely-forested area and the districts occupied by the civilized Liberians. The principal rubber-collecting stations are indicated.

SOUTH AFRICA.—Geological Sketch Map of Zululand. Scale, 5 statute miles to an inch. By William Anderson, Government Geologist. Second *Report* of the Geological Survey of Natal and Zululand. London, 1904.

The general survey of Zululand has been carried to the northwestern border. Much accurate information has been collected concerning the wide cretaceous belt of the littoral. In the Ecca series no evidence of the presence of coal in paying quantities has yet been discovered.

SOUTH AFRICA.—Geological Map of Melmoth District, Zululand. Scale, 1½ statute miles to an inch. By William Anderson, Government Geologist. Second Report of the Geological Survey of Natal and Zululand. London, 1904.

AMERICA.

WEST INDIES.—Cuba. Scale 1:1,875,000, or 29 statute miles to an inch. By H. Habenicht. *Pet. Mitteil.*, Vol. 51, No. 7. Justus Perthes, Gotha, 1905.

Illustrates a paper by Prof. Karl Sapper, on Cuba under U. S. military régime and as a Republic. The map was compiled from the old map by Coello, the British Admiralty charts, the U. S. Hydrographic Office charts, and the military map issued by our War Department in 1898. It is a very careful compilation of the best data available, is from two to three times as large as the atlas sheets of the island, and contains much information that cannot well be presented on maps of smaller scale.

UNITED STATES GEOLOGICAL SURVEY.

ALASKA.—Geologic Reconnaissance of the Yukon-Tanana Region. Scale, about 43 statute miles to an inch. By Louis M. Prindle, Arthur J. Collier, and Alfred H. Brooks. U. S. Geol. Sur., *Bull.* No. 251. Washington, D. C., 1905.

This map has most significance to the placer miner from the fact that it shows the distribution of the metamorphic sediments which nearly everywhere seem to be the source of the placer gold. Mr. Prindle, who writes the accompanying geologic sketch, says the igneous rocks of the Rampart formation may also be gold-bearing, but in the placer districts he has studied the source of the gold seems to lie in the metamorphic sediments, and hence the most promising fields for prospecting are the areas occupied by these rocks.

ALASKA.—Map of Forty Mile Quadrangle. Scale, 1:250,000, or 3.95 statute miles to an inch. U. S. Geol. Sur., *Bull.* 251. Washington, D. C., 1905.

This Quadrangle was mapped by Mr. E. C. Barnard in 1898. The map may be examined to advantage by those who are studying how to read contoured maps in connection with the geographical description beginning on page 18.

ALASKA.—Reconnaissance Map of Fairbanks and Birch Creek Districts. Scale, 1:250,000, or 3.95 statute miles to an inch. Alfred H. Brooks, Geologist-in-Charge. U. S. Geol. Sur., *Bull.* No. 251, Washington, D. C., 1905.

The area was surveyed in 1903. Topography by T. G. Gerdine and R. D. Oliver; triangulation by Mr. Gerdine. Contour interval, 200 feet. The probable drainage not surveyed is indicated by broken lines. In the Fairbanks district, the

mining region in which there is present interest lies between the Little Chena and the Chatanika Rivers, and is drained by their tributaries.

ALASKA.—Reconnaissance Map of Yukon-Tanana Region. Scale, 1:625,000, or 9.88 statute miles to an inch. Alfred H. Brooks, Geologist-in-Charge. U. S. Geol. Sur., *Bull.* No. 251, Washington, D. C., 1905. (In pocket.)

This topographic reconnaissance was made by Messrs. Gerdine and Oliver in 1903. The survey extends between Eagle on the Yukon and the Tanana, and from the Tanana to Circle on the Yukon. Curiously enough, there is one important gap between the Salcha River and Fairbanks, near the Tanana, due to the fact that the survey was here interrupted by a dense pall of smoke from forest fires.

ALASKA.—Geologic Reconnaissance Map of the Fairhaven Placer Field, Northeastern Portion of Seward Peninsula. Scale, 1:250,000, or 3.95 statute miles to an inch. By Fred. H. Moffit. U. S. Geol. Sur., *Bull.* No. 251, Washington, D. C., 1905. (In pocket.)

The sheet shows the areal distribution and structural relations of the different formations as accurately as possible, considering the short season of work. The distribution of the gravels producing gold and those known to carry gold are shown.

ALASKA.—Reconnaissance Map of the Northeastern Portion of Seward Peninsula. Scale, 1:250,000, or 3.95 statute miles to an inch. Alfred H. Brooks, Geologist-in-Charge. D. C. Witherspoon, Topographer. U. S. Geol. Sur., *Bull.* No. 251. Washington, D. C., 1905. (In pocket.)

The region mapped occupies the northeastern portion of Seward Peninsula, and includes a little more than one-quarter of its total area, or about 7,500 square miles. It embraces most of the mining precincts of the Fairhaven, Good Hope, Kugruk, and Koyuk districts. Viewed as a whole, the northern part of Seward Peninsula is characterized by low relief and monotonous appearance.

NEVADA.—Geological Reconnaissance Map of Nevada South of the 40th Parallel and Adjacent California. (Second Edition in pocket.) Scale, 1½ miles to an inch. By J. E. Spurr. U. S. Geol. Sur., *Bull.* No. 208. Washington, D. C., 1905.

A rough, general, geological map, made to fill up a large gap. While in its larger features it is correct and has much value as a pioneer map, it does not pretend to exactness as to details.

ASIA.

MALAYAN ARCHIPELAGO.—Map of the Philippines. Scale, about 60 statute miles to an inch. The *Nat. Geol. Mag.*, August, 1905, Washington, D. C.

This map is evidently a U. S. Government product, but its origin is not mentioned. The relief is poorly shown, even considering the meagre data. The nomenclature is by no means as full as the scale would justify. The chief purpose seems to be to show the Government and private telegraph and cable lines, which are very clearly indicated. The cable from Guam enters Philippine waters through San Bernardino Strait north of Samar, and passes between Luzon and Mindoro to Manila.

CHINESE TURKESTAN.—Map of Portions of Chinese Turkestan. Surveyed under the Direction and with the Assistance of M. A. Stein. (Two Sheets.) Scale, 12 statute miles to an inch. Compiled in the Trigonometrical Branch Office, Survey of India, Dehra Dun, 1903.

This map illustrates the explorations of Dr. Stein in 1900-01, when he found many remarkable ruins of ancient civilization in the Takla-Makan Desert in the southern part of the Tarim Basin. Most of the country is shown for several miles on both sides of his route, and all ruins, springs, the limits of cultivation along the desert, mountain ranges with permanent snow, glaciers, numerous heights in feet and other information are given. Latitudes were astronomically determined, and the longitudes require a correction of 2′ 7″ to make them accord with the geodetic longitude of Madras Observatory.

CHINESE TURKESTAN.—Map of Muztagh-Ata and Lake Little Karakul. Prepared by Lieut. F. B. Tillard from photo; Theodolite Survey by M. A. Stein. Scale, four statute miles to an inch. Trigonometrical Branch Office, Survey of India, Dehra Dun.

In the region of the water-parting between the Tarim and the Amu-daria (Oxus) River systems.

CENTRAL ASIA.—Geological Sketch Map of Parts of the Provinces of Tsang and Ü in Tibet. Scale, 32 statute miles to an inch. By H. H. Hayden. *Records* of the Geological Survey of India, Vol. 32, Part 2. Calcutta, 1905.

The geological observations in Southern Tibet recorded on this map were made by Mr. Hayden during the mission to Lhasa under Col. Sir F. E. Younghusband, who has called attention to the untiring energy of this observer in utilizing every opportunity for scientific work while in a hostile country. The map shows that the Tibetan zone to the north of the Sikkim boundary is composed of a variety of sedimentary formations representing the lower Tertiary, Cretaceous, Jurassic, probably Trias, and possibly some of the Palæozoic systems. The formations are often metamorphosed, but occasionally highly fossiliferous.

EUROPE.

GERMANY.—Die Herkunft der deutschen Siedler im Königreich Sachsen nach Ortsnamen und Mundarten. By P. Langhans, after Alfred Meiche. *Deutsche Erde,* Vol. 4, No. 5. Justus Perthes, Gotha, 1905.

Nine small maps of Saxony, designed to show the origin of the German settlers as indicated in the nomenclature and the spoken dialects.

TURKEY-IN-EUROPE.—Harta Geografica a Turciei Cu Comunele Românesti. Scale, 1:1,250,000, or 19.7 statute miles to an inch. *Buletin* of the Rumanian Geographical Society, Vol. 25, No. 2, 1904, Bucharest.

Shows the areas in European Turkey which are chiefly occupied by Rumanians.

NORWAY.—Topografisk Kart over kongeriget Norge. Scale, 1:100,000, or 1.5 statute miles to an inch. By the Norwegian Geographical Institute. Christiania. (Price, kr. 0.60 a sheet.) Sheets: Galdhöpiggen, 30 D; Svartisen, J 15; Hammerfest, U 3; Rolfsö, U 2; Söndre Faemund, 38 B; Dunderlandsdalen, K 15; Hjelmsö, V 1; Tana, Z 3; Kristiansand, 5 A; Kristiania, 14 D; Hönefoss, 19 B; Gran, 19 D; Hamar, 26 A; Aamot, 26 C.

The Norwegian Geographical Institute, founded in 1867, was united in 1872 with the Topographic Survey, and since then all the official surveys and maps of Norway have been the product of one or another of the six departments of the Institute. The work on the topographic map has been in progress for about thirty years and up to April last 183 of the topographic sheets had been completed, work was in progress on 13 sheets, and the geological data had been superimposed on

26 sheets of the topographic map. Over one-third of the area is still to be surveyed. These sheets are fine specimens of cartography. The earlier ones were engraved on copper, but lithography and photo-engraving have been employed since 1881. Hill features are shown chiefly by contours with 100 feet interval, and in some areas by hachures. Standing waters are in blue, rivers in black, glaciers in green, and forests and important tilled areas are indicated. The location of many small towns is shown without names. In a thinly-peopled land so crowded with mountains as to make topographic surveying very difficult and expensive, as in Norway, progress in detailed map-making is necessarily slow; but that country is to be congratulated upon the high quality and advanced state of its topographic map.

POLAR.

ANTARCTIC.—Bathymetrical Survey of the South Atlantic Ocean and Weddell Sea. Scale of latitude, 1:14,000,000, or 220 statute miles to an inch. By William S. Bruce. *Scot. Geog. Mag.*, August, 1905, Edinburgh.

The map accompanies a paper by Mr. Bruce, leader of the Scottish National Antarctic Expedition. Eight tints show contours of depth. Illustrating the results of the *Scotia's* bathymetrical work, it is interesting to compare it with previous maps, which are chiefly theoretical, and based, to a large extent, only on Ross's soundings. Mr. Bruce uses the few soundings taken by the Swedish expedition to the west, and those of the *Valdivia* to the east, of Bouvet Island.

Among the especially interesting features is the deepening of the ocean as the *Scotia* sailed eastward in Weddell Sea; the coast for 150 miles of the newly-discovered Coats Land, at two points along whose shores, thirty miles apart and two miles from land, the *Scotia* made soundings of 159 and 161 fathoms; the line of shallow water up to Gough Island for 750 miles along the meridian of 10° W.—a discovery of the greatest importance, as it shows a continuation of the South Atlantic rise 1,000 miles farther south than it was known to exist; and the hypothetical coast-line of Antarctica according to Bruce, who gives a much larger extension to the south polar continent and makes it appear more continuous, especially in the regions of Graham Land and the Weddell Sea, than any other recent cartographer.

ANTARCTIC.—Deep Sea Deposits of the South Atlantic Ocean and Weddell Sea. Scale of latitude, 1:14,000,000, or 220 statute miles to an inch. By J. H. Harvey Pirie. *Scot. Geog. Mag.*, August, 1905.

Illustrates a paper by Mr. Pirie on the dredging results of the *Scotia* expedition. A belt of Globigerina ooze, narrowing towards the west, is shown, roughly speaking, as far south as the 55th parallel. It includes an area of red clay; this is succeeded on the south by the circumpolar band of Diatom ooze, which, in turn, gives place to blue mud and terrigenous deposits and an area of blue mud approaching red clay in the most southerly waters visited. Specimens of volcanic mud were obtained most frequently in the southern areas, and may be the product of sub-marine volcanic activity, or they are perhaps derived from the active volcanoes or volcanic rocks of West Antarctica or the South Shetlands.

ATLASES.

MEYERS HAND-ATLAS.—Dritte, neubearbeitete und vermehrte Auflage, mit 115 Kartenblättern and 5 Textbeilagen. 40 Lieferungen, including index to place-names. Verlag des Bibliographischen Instituts, Leipzig and Vienna, 1905. (Price,

30 pf. a part, or M. 15 for the Atlas bound, including index to place-names; M. 10, not including index.)

A superior small atlas at a very cheap price. Many of the plates are the latest revision of map plates in the sixth edition of Meyers Konversations Lexikon; others appear to have been especially made for the Atlas. The effort is apparent to give the latest information, the excellent map of German Southwest Africa showing military routes and battlefields in 1904, and the concentration camps of the Herero and Hottentots. Special prominence is given to Germany, its Colonies, and Austria-Hungary, as they have 44 of the 115 map sheets. The remainder of Europe has 28 sheets; Asia, 13; Africa, 6; America, 15; and Australia and Oceania, 2. The size of the page makes this Atlas very easy to handle. Accurate map products, such as this, are calculated to serve the needs of a large part of the public, even though lacking much information that can be supplied only on maps of larger scale.

STIELER'S HAND-ATLAS.—Neue neunte Lieferungs-Ausgabe. 100 Karten in Kupferstich. Lieferungen 47 and 48. Justus Perthes, Gotha, 1905. (Price, 60 pf. for each part containing 2 map sheets.)

This finest edition of Stieler's Hand-Atlas is now approaching completion. The progress of oceanography in the past ten years is strikingly illustrated by comparing sheet 3 with the corresponding sheet of the eastern and western hemispheres in the edition of 1895. Many changes in the contours of the ocean beds, especially in the Pacific and Antarctic Oceans, are indicated. Sheet 4, the commercial and political map on the Mercator projection, is most noteworthy for fulness of information relating to sea routes, which are shown in far greater number than in the earlier editions. The Cable Routes inset is reproduced, but the other two insets are new. One shows the fastest routes of transportation between the continents and around the world, and the other the official languages of the various countries. Sheet 68, the general map of Africa, marks the present political boundaries, indicates sand wastes for the first time by colour, gives contours of depth around the coasts, and shows the present state of railroad development. Sheet 75 is South Africa as far north as 10° S. Lat. on a scale of 1:7,500,000. The eight sheets of Africa are all new plates, and the manner in which they divide the continent makes them more convenient for reference than the earlier map of Africa in this Atlas.

HYDROGRAPHIC OFFICE CHARTS.

Pilot Chart of the North Atlantic Ocean. August, 1905.

The path of the total solar eclipse across the ocean is superimposed. Extracts from circulars issued by the U. S. Naval Observatory relating to the eclipse are printed on the reverse side.

Pilot Chart of the North Atlantic Ocean. September, 1905.

The paper by Mr. James Page, editor of the Pilot Charts, on West Indian Hurricanes, is reprinted on the reverse side from Hydrographic Office Publication No. 86.

Pilot Charts of the North Pacific Ocean. August and September, 1905.

In view of the approaching period of maximum frequency of typhoons in the Eastern Asiatic waters, a description and explanation of them are printed, with a chart illustrating a cyclonic storm at sea in the northern hemisphere.

ACCESSIONS TO THE LIBRARY.

July–September, 1905.

AFRICA.

Barrois, Julien.—Les Irrigations en Égypte. (Planches.) Paris, Ch. Béranger, 1904. 8vo.

Egypt Exploration Fund. Archæological Survey of Egypt. Fourteenth Memoir: Rock Tombs of El Amarna, Part II. By N. de G. Davies. 47 Plates. London, Egypt Ex. Fund, 1905. 4to.

Freycinet, C. de.—La Question d'Égypte. Paris, Calmann-Lévy [1905]. pr., 8vo.

Samassa, Paul.—Das neue Südafrika. Berlin, C. A. Schwetschke und Sohn, 1905. 8vo.

Schillings, C. B.—Mit Blitzlicht und Büchse. Neue Beobachtungen . . . in der Wildnis . . . von Äquatorial-Ostafrika. (Abbildungen.) Leipzig, R. Voigtländer, 1905. 8vo.

Weisgerber, F.—Trois Mois de Campagne au Maroc. Étude Géographique . . . Cartes, &c. Paris, Ernest Leroux, 1904. 8vo. [*Gift, from the author.*]

Williams, Gardner F.—The Diamond Mines of South Africa. Illustrated. New York, B. F. Buck & Co., 1905. 2 vols., 8vo. [*Gift, from the Author.*]

AMERICA.

Anspach, C. A.—Geschichte und Beschreibung von Newfoundland und der Küste Labrador. Aus dem Englischen übersezt. Mit 2 Charten. *Neue Bibliothek der wichtigsten Reisebeschreibungen* [*30th vol. of Second Series, 2nd Part*]. Weimar, Gr. H. S. p. Landes-Industrie Comptoirs, 1822. 16mo.

Buies, Arthur.—Le Saguenay et la Vallée du Lac St. Jean. Québec, A. Coté et Cie, 1880. 16mo.

Campbell, Duncan.—History of Prince Edward Island. Charlottetown, Bremner Bros., 1875. 16mo.

Dawson, Samuel Edward.—The Saint Lawrence: its Basin and Border-Lands. Maps, &c. New York, Frederick A. Stokes Co. (1905). 8vo.

Gosselin, Auguste.—Jean Bourdon et son ami l'abbé de Saint-Sauveur. Episodes des Temps héroiques de notre Histoire. Québec, Dussault et Proulx, 1904. 16mo. [*Gift from l' Université Laval, Quebec.*]

Gutiérrez de Santa Clara, Pedro.—Historia de las Guerras Civiles del Perú (1544–1548) y de Otros Sucesos de las Indias. Tomo III. *Colección de Libros y Documentos Referentes á la Historia de América, Tomo IV.* Madrid, Victoriano Suárez, 1905. 8vo.

Harris, William Tell.—Bemerkungen auf eine Reise durch die Vereinten Staaten von Nord-Amerika, 1817–1819. Aus dem Englischen übersezt von C. F. Leidenfrost. *Neue Bibliothek der wichtigsten Reisebeschreibungen* [*30th vol. of Second Series, 1st Part*]. Weimar, Gr. H. S. p. Landes-Industrie-Comptoirs, 1822. 16mo.

HEILPRIN, ANGELO.—Tower of Pelée. New Studies of the Great Volcano of Martinique. Illustrated. Philadelphia, J. B. Lippincott Co., 1904. 4to.

LYNCH, JEREMIAH.—Trois Ans au Klondike. Traduit de l'anglais par Paul Lefèvre. (Carte, &c.) Paris, Ch. Delagrave [1905?] pr., 8vo.

MINNESOTA HISTORICAL SOCIETY.—Collections, Vol. 1. Being a Republication of the Original Parts issued in 1850–'56. St. Paul, Ramaley, Chaney & Co., 1872. 8vo.

NUÑEZ, RICARDO ET JALHAY, HENRY.—La République de Colombie. 2e Edition. Bruxelles, Désiré Stevelinck, 1898. 8vo.

PERPIÑÁ, ANTONIO.—El Camagüey. Viajes pintorescos por el interior de Cuba y por sus costas. [Illustrated.] Barcelona, J. A. Bastinos, 1889. 8vo.

SHELDON, E. M.—The Early History of Michigan, from the first Settlement to 1815. [Plan, &c.] New York, A. S. Barnes & Co., 1856. 8vo.

STRAKOSCH, SIEGFRIED.—Amerikanische Landwirtschaft. Eine Reisestudie. 56 Abbild. und 1 karte. Wien, Wilhelm Frick, 1905. pr., 8vo.

TORRE, JOSÉ MARIA DE LA.—Lo Que Fuimos y Lo Que Somos, ó la Habana Antigua y Moderna. [Map.] Habana, Spencer y Compañia, 1857. 8vo.

WEGENER, GEORG.—Reisen im Westindischen Mittelmeer. Mit Abbildungen . . . und 4 Kartenskizzen. 2te Auflage. Berlin, Allgemeiner Verein für Deutsche Literatur, 1904. 8vo.

WILSON, RUFUS ROCKWELL.—Historic Long Island. Illustrated. New York, Berkeley Press, 1902. 8vo.

WILSON, WILLIAM.—Newfoundland and its Missionaries. Cambridge, Mass., Dakin & Metcalf, 1866. 8vo.

ASIA.

ABELLA Y CASARIEGO, ENRIQUE.—Descripción Física, Geológica y Minera de la Isla de Panay. Publicación Oficial. Manila, Chofré y Ca., 1890. 8vo.

BEHRMANN, MAX T. H. S.—Hinter den Kulissen des mandschurischen Kriegstheatres. Berlin, C. A. Schwetschke und Sohn, 1905. pr., 16mo.

BOWREY, THOMAS.—Geographical Account of Countries Round the Bay of Bengal, 1669–1679. Edited by Sir Richard Carnac Temple. (Illustrations and chart.) Cambridge, Hakluyt Society (Second Series, No. XII.), 1905. 8vo.

BURCKHARDT, JOHN LEWIS.—Travels in Arabia. (Maps and Plans.) London, Henry Colburn, 1829. 2 vols., 8vo.

CENTENO, JOSÉ., ROSARIO Y SALES, ANACLETO DEL., VERA Y GÓMÉZ, JOSÉ DE.—Memoria Descriptiva de los Manantiales Minero-Medicinales de la Isla de Luzon. Publicada de Real Orden. Madrid, M. Tello, 1890. 8vo.

EHAÚZ, R.—Apuntes de la Isla de Negros. Manila, Chofré y Comp.a, 1894. 8vo.

ELIAS, N., *Editor*.—History of the Moghuls of Central Asia, being the Tarikh-i-Rashidi of Mirza Muhammad Haidar, Dughlát. Translation by E. D. Ross. Map, &c. London, Sampson Low, 1898. 8vo.

HACKMANN, H.—Vom Omi bis Bhamo. Wanderungen an den Grenzen von China, Tibet und Birma. Illustriert von Alfred Wessner. Halle a. S., Gebauer-Schwetschke. . . . 1905. sq. 16mo.

INDIA, CENSUS OF.—Vol. I, Part 1, Report, by H. H. Risley and E. A. Gait; Vol. 1, Ethnographic Appendices, by H. H. Risley. (Maps.) Calcutta, Gov't

Print, 1903. 2 vols., folio. [*Gift, from R. L. Ross, Under Secretary, Government of Bengal.*]

LIBBEY, WILLIAM AND HOSKINS, FRANKLIN E.—The Jordan Valley and Petra. Maps and Illustrations. New York, G. P. Putnam's Sons, 1905. 2 vols. 8vo. [*Gift, from the Authors.*]

PHILIPPINE ISLANDS, 1493–1898.—Explorations of Early Navigators, &c., as related in contemporaneous Books and MSS. Translated from the Originals. Edited, &c., by Emma Helen Blair and James Alexander Robertson. With maps, &c. Vols. XXIV–XXIX. Cleveland, A. H. Clark Co., 1905. 8vo.

PIRIOU, ERNEST.—L'Inde Contemporaine et le Mouvement National. Paris, Félix Alcan, 1905. 16mo.

SANDBERG, GRAHAM.—An Itinerary of the Route from Sikkim to Lhasa, together with a Plan of the Capital of Tibet and a new Map. . . . Calcutta, Printed for the Author, 1901. 8vo.

SANGERMANO, *Father.*—Description of the Burmese Empire, compiled chiefly from native documents. Translated by Mrs. Wm. Tandy. Rome, Oriental Translation Fund of Great Britain and Ireland, 1833. 4to.

AUSTRALASIA.

MARSHALL, P.—The Geography of New Zealand. With contributions by J. W. Gregory, A. Hamilton, and G. Hogben. (Illustrations [including maps].) Christchurch, N. Z. et al. Whitcombe and Tombs [1904]. 16mo.

EUROPE.

GRAEBNER, PAUL. [*Editor.*] Handbuch der Heidekultur. Unter Mitwirkung von Otto von Bentheim. Mit einer Karte und 48 Figuren im text. Leipzig, Wilhelm Engelmann, 1904. pr., 8vo.

GUDMUNDSSON, VALTYR.—Island am Beginn des 20 Jahrhunderts. Aus dem Dänischen von Richard Palleske. Abbildungen. Kattowitz, Gebrüder Bohm, 1904. 8vo.

KELLER, HERMANN.—Die Hochwassererscheinungen in den deutschen Strömen. Jena, H. Costenoble, 1904. 4to.

MILL, HUGH ROBERT.—The Distribution of Rain over the British Isles during the year 1904, as observed at about 4000 Stations in Great Britain and Ireland, with articles upon various branches of rainfall work. (Illustrations [including maps].) London, Edward Stanford, 1905. 8vo. [*Gift, from the Author.*]

RABOT, CHARLES.—La distribution de la population en Suède en fonction de la constitution géologique du sol. [4 illustrations, figure and map.] *Extrait du Bulletin de la Société de Géographie "La Géographie," Tome XI, 1905.* Paris, pr., 8vo. [*Gift, from the Author.*]

RABOT, CHARLES.—Les marais du Bas-Poitou, d'après M. Étienne Clouzot. [With 2 figures.] *Extrait, Bulletin de la Société de Géographie, "La Géographie," Tome X, 1904.* Paris, pr., 8vo. [*Gift, from the Author.*]

TÜRKEI, RUMÄNIEN, SERBIEN, BULGARIEN. Meyers Reisebücher. 6te Auflage. 10 Karten, 30 Plänen, &c. Leipzig u. Wien, Bibliographisches Institut, 1902. 16mo.

WALLACE, DONALD MACKENZIE.—Russia. Revised edition, with 2 maps and portrait. New York, Henry Holt & Co., 1905. 8vo.

ZEITSCHRIFT DES DEUTSCHEN UND ÖSTERREICHISCHEN ALPENVEREINS. Bände 27–35, 1896–1904. [With Maps and Plates.] Graz, München, Innsbruck. 8vo.

MAPS AND ATLASES.

[AFRICA.] KARTE VON DEUTSCH OSTAFRIKA in 29 Blatt und 8–10 Ansatzstücken. *Scale:* 1:300,000 = 4¾ miles = 1 inch. Konstruirt . . . von R. Kiepert. Berlin, Dietrich Reimer, 1895—. [24 of the sheets received, each with descriptive text.]

AFRICA. MONROVIA, Sheet 71 [of large-scale map], compiled in the Topographical Section, General Staff. Ordnance Survey Office, Southampton, 1905. *Scale:* 1:1,000,000 = 1.014 inches = 16 miles. *Size:* 26¼ x 17½ inches.

AFRICA. RHODESIA, divided into Provinces and Districts under the Administration of the British South Africa Company, 1903. London, Stanford. *Scale:* 1:1,000,000 = 16 English miles = 1 inch. 6 sheets, each 24 x 33½ inches. Coloured. [*Gift, from the British South Africa Co., London.*]

AFRICA. RIVER ZAMBESI from Zumbo to the Victoria Falls. London, Stanford [1904?]. *Scale:* 1:250,000 = 3.94 miles = 1 inch. Three Sheets, each 28¼ x 17½ inches. [*Gift, from the British South Africa Co., London.*]

[ASIA.] ASIE 1:1,000,000 = 16 miles = 1 inch. [Map in course of publication by the Service géographique de l'Armée, Paris.] Asterabad; Boukhara; Hérat; Maïméné; Merv. *Size:* [of each sheet] 21¼ x 17½ inches. 1901–1902.

[ATLAS, WORLD.] DEBES, E.—Neuer Handatlas über alle Teile der Erde. 61 Haupt- und 124 Nebenkarten, mit Alphabetischen Namenverzeichnis. 3te verbesserte Auflage. Leipzig, H. Wagner & E. Debes, 1905. Folio.

BALI, Schetskaart van het Eiland. *Scale:* 1:250,000 = 3.7 miles = 1 inch. *Size:* 25¼ x 17 inches. Batavia, Topographisch Bureau, 1905. Coloured. [*Gift, from the Topographic Bureau of Netherlands India, Batavia.*]

CALIFORNIA.—Graphical Statistics of Meteorology for Southern California at Los Angeles by Months from 1877 to 1905. Constructed from Official Data by George I. Herrick, C. E., Graphical Statistician. Los Angeles, 1905. Blue Print, *Size:* 11¼ x 19½ inches. [*Gift, from George I. Herrick, Los Angeles, Cal.*]

CANADA. ONTARIO, Hamilton Sheet. [Being Sheet 2. S. W. of the Standard Topographical Map.] [Ottawa] Dept. of the Interior, 1905. *Scale:* 1:250,000 = 3.95 miles = 1 inch. *Size:* 19¾ x 26½ inches. Engraved and lithographed in colour. [*Gift, from James White, Geographer, Ottawa.*]

CATTARAUGUS COUNTY, N. Y., Atlas of. Compiled & published by D. G. Beers & Co., New York, 1869. 4to.

[CHILE] CANAL SMYTH: Bahía Muñoz Gamero. *Scale:* 1:20,000 = 3½ inches = 1 nautical mile. *Size:* 13¼ x 12¼ inches. Valparaiso, Oficina Hidrográfica, 1905. [*Gift.*]

[CHILE] ESTERO COMAU O LEPTEPU. Por la Comisión Hidrográfica de la Cañonera "Pilcomayo." *Scale:* 1:120,000 = (about) 2 nautical miles = 1 inch. *Size:* 18½ x 26¼ inches. Valparaiso, Oficina Hidrográfica, 1905. [*Gift.*]

CHILE. TIERRA DEL FUEGO, PUERTOS DEL CANAL COCKBURN: Puerto Barrow. *Scale:* 1:5,000 = (about) 12 inches = 1 nautical mile; Puerto Soffia. *Scale:* 1:15,000 = (about) 4 inches = 1 nautical mile. *Size:* 13¾ x 8⅞ inches. Valparaiso, Oficina Hidrográfica. [1905.] [*Gift.*]

DUTCHESS CO., New York, Map of. Chas. Bachman, G. H. Corey. Philadelphia, John E. Gillette, 1858. *Scale:* 1⅜ inches = 1 mile. *Size:* 55 x 57 inches. Mounted as Wall Map.

[HIMALAYAS] Muztāgh-Ata and Lake Little Karakul. Prepared by Lieut. F. B. Tillard, from Photo-Theodolite Survey of M. A. Stein, Ph. D. Surrounding District from Plane-Table Survey of Sub-Surveyor S. R., 1900. *Scale:* 1 inch to 4 miles. *Size:* 11¼ x 12 inches. Calcutta, (Survey of India Offices.) Coloured. [*Gift, from the Survey of India, Trigonometrical Branch, Dehra Dun.*]

LIVERPOOL BAY. Surveyed by the Marine Surveyor of the Mersey Docks and Harbour Board. *Scale:* 2 inches = 1 nautical mile. *Size:* 26⅝ x 23⅝ inches. Liverpool, 1904. [With 5 pp. "Tides Reduction Tables.] [*Gift, from the Mersey Docks and Harbour Board, Liverpool.*]

[MAGELLAN STRAIT.] Puertos del Seno Otway; Puerto Pomar, *Scale:* 1:10,000 = 7 inches to 1 nautical mile; Puerto Toro, *Scale:* 1:10,000; Puerto Valderrama, *Scale:* 1:5,000 = (about) 14 inches = 1 nautical mile. Valparaiso, Oficina Hidrográfica, 1905. [*Gift.*]

MERSEY, RIVER, from Rock Lighthouse to Eastham and Garston, 1901. Henry Belam, H. G. G. Ashton, Marine Surveyors. *Scale:* 3½ inches = 1 nautical mile. *Size:* 35⅞ x 23½ inches. Liverpool, 1905. [*Gift, from the Mersey Docks and Harbour Board.*]

MONTGOMERY AND FULTON COUNTIES, New York, Atlas of. From Surveys under direction of B. Nichols (and others). New York, J. Jay Stranahan & Beach Nichols, 1868. 4to.

NEW JERSEY, Geological Survey of. Atlas Sheets Nos. 22, 23, 24, 26, 27, 28, 31 and 32. Henry B. Kümmel, State Geologist. C. C. Vermeule, Topographer. *Scale:* 1 mile = 1 inch. *Size* [each sheet]: 23 x 32¼ inches. [Trenton, N. J.] Revised, 1903.

NEW JERSEY, Topographic Atlas Sheets: Chester; Boonton; Dover-Stanhope. *Scale:* 2⅝ inches = 1 mile. *Size* [each sheet]: 30¼ x 25¼ inches. [Trenton, N. J.] Henry B. Kümmel, State Geologist. C. C. Vermeule, Topographer. Edition of 1905.

NEW YORK CITY.—Longworth's Explanatory Map and Plan. With alphabetical list of Streets, &c. New York, David Longworth, 1817. *Scale* [of map] 8,000 feet = 1 inch, [of plan] ⅛ of a mile = inch. *Size:* 24 x 19 inches. Mounted as Wall Map.

NEW YORK [CITY], Twelve Miles Around. Sidney's Map. Engraved on Stone by J. Friend, Philadelphia. [Published by] J. C. Sidney, New York, 1849. *Scale:* 1 mile = 1⅜ inches. *Size:* 33½ x 33 inches. Mounted as Wall Map.

[NORWAY.] TOPOGRAFISK KART OVER KONGERIGET NORGE. *Scale:* 1:100,000 = 1½ miles = 1 inch. [14 sheets, each 17½ x 14¾ inches, and 2 Index sheets.] Kristiania, 1905. [*Gift, from the Norges geografiske opmaaling.*]

[OCEAN.] CARTE GÉNÉRALE BATHYMÉTRIQUE DES OCÉANS. Dressée par ordre de S. A. S. le Prince de Monaco, d'après le mémoire de M. le Professeur Thoulet. Adopté par la Commission de nomenclature Sub-océanique et par le Congrès international de Géographie de Washington (8 Septembre, 1904), sous la direction de M. Charles Sauerwein, Enseigne de Vaisseau. Par M. Tollemer, avec la collaboration de MM. Bataille, Bolzé, Lebas, Lévêque, Morelli, Normand. *Echelle:* 1:10,000,000 = 166 nautical miles = 1 inch. 24 Sheets, and Index Sheet, each 44 x 29½ inches. Monaco, Musée Océanographique, 1904.

ONEIDA COUNTY, New York, Atlas of. Compiled and published by D. G. Beers & Co., Philadelphia, 1874. 4to.

ONEIDA CO., New York, Gillette's Map of. From Surveys under the direction of J. H. French. Philadelphia, John E. Gillette, 1858. *Scale:* 1¼ inch = 1 mile. *Size:* 61 x 64 inches. Mounted as Wall Map.

PANAMA, Map of the Republic of. Prepared in the War Department, Office of Chief of Staff, Second (Military Information) Division. General Staff, U. S. A., January, 1904. *Scale:* 11 miles = 1 inch. *Size:* 44½ x 22¾ inches. [*Gift, from the War Department, Washington.*)

PHILADELPHIA, East Prospect of the City of. Taken by George Heap from the Jersey Shore, under the Direction of Nicolas Scull, Surveyor. With Plan, two additional Views and Statistics. (London, 1753.) *Reprint*, Philadelphia, E. H. Coggins, 1854. *Size*, 36 x 22 inches. Mounted as Wall Map.

ROME, ONEIDA CO., N. Y., Map of. Surveyed and Published by Henry Hart, New York, 1851. *Scale:* 280 feet = 1 inch. *Size:* 18 x 25 inches. Mounted as Wall Map.

SARATOGA AND BALLSTON [N. Y.], Combination Atlas of. F. W. Beers and Louis H. Cramer. New York, J. B. Beers & Co., 1876. 4to.

SWITZERLAND. Gesamtkarte der Schweiz. *Scale:* 1:400,000 = 6⅓ statute miles = 1 inch. *Size:* 36 x 24 inches. Bern, H. Kümmerly & Frey und A. Francke [1904]. Coloured. References in German and French. Accompanied by Namenverzeichnis, von H. Kümmerly, 78 pp., 16mo.

SWITZERLAND. TOPOGRAPHISCHER ATLAS DER SCHWEIZ (Siegfried Atlas.) Blatt 492, Keppel, 1884. *Scale:* 1:50,000 = 1¼ inches = 1 statute mile; Ueberdrücke [on same scale]: Evolena-Zermatt-Monte Rosa, 1904; Jungfraumassiv-Oberwallis, 1904; Ober-Engadin, 1904. Ueberdrücke, *Scale:* 1:25,000 = 2½ inches = 1 statute mile: Zürich, 1904; Luzern, 1903; Carte Topographique du Canton de Genève, 1900. Bern, Schweiz. Landestopographie. [*Gift.*]

TURKESTAN, CHINESE. Map of Portions of. Surveyed under the Direction and with the Assistance of M. A. Stein, Ph. D., by Sub-Surveyor S.-R. 1900–01. *Scale:* 1 inch to 12 miles. Two sheets, each 24 x 27 inches. Calcutta, Survey of India Offices. Coloured. [*Gift, from the Survey of India, Trigonometrical Branch, Dehra Dun.*]

ULSTER, New York, County Atlas of. From . . . Surveys and Records, under the Superintendence of F. W. Beers. New York, Walker and Jewett, 1875. 4to.

UNITED STATES and Part of Canada, Reduced Survey Map. By J. G. Bartholomew. *Scale:* 1:5,000,000, or 79 English miles to an inch. *Size:* 38½ x 28½ inches. 8 Insets, various scales. Edinburgh, The Edinburgh Geographical Institute, 1905. Sheet, coloured.

YUKON TERRITORY: Kluane, White, and Alsek Rivers. From Surveys by International Boundary Commission, 1893–95 [and others]. [Ottawa], Dept. of the Interior, 1905. *Scale:* 1:400,000 = 6.32 miles = 1 inch. *Size:* 23 x 32¾ inches. [*Gift, from James White, Geographer, Ottawa.*]

POLAR.

NORDENSKJÖLD, OTTO G., AND ANDERSON, JOH. GUNNAR.—Antarctica, or, Two Years amongst the Ice of the South Pole. (Maps, &c.) London, Hurst and Blackett, 1905. 8vo.

VARIOUS.

American Catalogue, 1900–1905. New York, Publishers' Weekly, 1905. 8vo.

Biographical Sketches of Distinguished Officers of the Army and Navy (of the United States). [With Portraits.] New York, L. R. Hammersly, 1905. 8vo. [*Gift, from General J. Watts de Peyster.*]

Brode, Heinrich.—Tippu Tip. Lebensbild eines zentralafrikanischen Despoten. [With Portrait.] Berlin, Wilhelm Baensch, 1905. 8vo.

[Encyclopædia.] Meyers Grosses Konversations-Lexikon. (6te Auflage.) Band X. Leipzig u. Wien, Bibliographisches Institut, 1905. 8vo. [Illustrated.]

(Esquemeling [John].)—The History of the Buccaneers of America; containing detailed accounts of those Bold and Daring Freebooters, &c., &c. [Map & 15 woodcuts.] Boston, Benj. B. Mussey & Co., 1853. 8vo.

Fallex, M., et Mairey, A.—Amérique, Australasie au début du XXe Siècle. (Cartes et gravures.) Paris, Ch. Delagrave (1905). 16mo.

Forest Congress, American.—Proceedings, 1905. Washington, American Forestry Association. 1905. 16mo.

Geddes, Patrick.—City Development. A Study of Parks, Gardens and Culture and Culture-Institutes. Report, Carnegie-Dunfermline Trust. Plan, &c. Edinburgh, Geddes & Co. 1904. 4to.

Grant, Madison.—The Rocky Mountain Goat. (With 15 Illustrations.) *Reprinted from the Ninth Annual Report of the New York Zoological Society, 1905;* The Caribou. (With 21 Plates.) *Reprinted from the Seventh Annual Report of the New York Zoological Society, 1902;* The Origin and Relationship of the Large Mammals of North America. *Reprinted from the Eighth Annual Report of the New York Zoological Society, 1904.* [Three in one volume, 8vo.] [*Gift, from the Author.*]

Haack, Hermann.—Geographen-Kalender. 3ter Jahrgang, 1905–1906. Bildnis und 16 Karten. Gotha, Justus Perthes. 1905. 16mo.

Hakluyt, Richard.—Principal Navigations, Voyages, Traffiques and Discoveries of the English Nation. [New Edition.] (Illustrations.) *Extra Series, Hakluyt Society.* Vol. XII. Glasgow, J. McLehose & Sons. 1905. 8vo.

Hatfield, Henry Rand (*Editor*).—Lectures on Commerce. Delivered before the College of Commerce and Administration of the University of Chicago. *Publications of the College of Commerce, Vol. 1.* Chicago, University of Chicago Press. 1904. 8vo. [*Gift, from the College of Commerce.*]

Hawaii, Journal of a Tour Around. (From the Journal of William Ellis.) (Map and Illustrations.) Boston, Crocker & Brewster. 1825. 12mo.

Kirchhoff, Alfred.—Mensch und Erde. Leipzig, B. G. Teubner. 1905. 8vo.

Maillet, Edmond.—Essais d'Hydraulique Souterraine & Fluviale. Paris, A. Hermann. 1905. pr., 8vo.

Simpson, W. J.—The Maintenance of Health in the Tropics. *Published under the Auspices of the London School of Tropical Medicine.* [Illustrated.] London, John Bale, Sons and Danielsson. 1905. 8vo.

Spilbergen, George de.—Miroir Oost & West-Indical, auquel sont descriptes les deux dernieres Navigations, faictes ès Années 1614–18, l'une par . . . . ———, ... l'autre par Jacob le Maire . . . . . Cartes et Figures. A Amstelredam, Jan Jansz. 1621. Oblong 4to.

TOZIER, JOSEPHINE.—The Travelers' Handbook. A Manual for Transatlantic Tourists. New York, Funk & Wagnalls Co. 1905. 16mo.

VAMBÉRY, ARMINIUS.—The Story of my Struggles. Memoirs of ———. (4 Illustrations.) London, T. Fisher Unwin. 1904. 2 vols. 8vo.

VIGNAUD, HENRY.—Études Critiques sur la Vie de Colomb avant ses Découvertes. Paris, H. Welter. 1905. pr. 8vo. [*Gift, from the Author.*]

WHEELER, WILLIAM A.—Who Wrote It? An Index to the Authorship of the more noted works in Ancient and Modern Literature. Edited by Chas. G. Wheeler. Boston, Lee & Shepard. 1882. sq. 16mo.

BOOK NOTICES.

Meteorological Results of the Nansen Expedition.—The Norwegian North Polar Expedition, 1893-96. Scientific Results, edited by Fridtjof Nansen. Vol. VI. Meteorology. By H. Mohn. Published by the Fridtjof Nansen Fund for the Advancement of Science. 1905. Pp. xiv + 659. Pls. XX.

In these days of many polar expeditions, both Arctic and Antarctic, and of great expectations regarding the results to be obtained from the study of the scientific observations made during these expeditions, it is a distinct satisfaction to have before us the present volume. Vol. VI of the Nansen Expedition is an admirable reduction and a thoroughly scientific study of the meteorological records made during that memorable voyage of the *Fram*. Professor Mohn, of Christiania, well known the world over for his work in meteorology, has prepared the volume. In the preface Nansen pays a well-merited tribute to Dr. Mohn and to his share in contributing to the scientific success of the Expedition. It was after reading an article by Mohn that Nansen first thought of planning his voyage. "Mohn was one of the few who always believed in the practicability of the plan." He was among those who bade farewell to Nansen's party at Vardö in 1893, and was also the first friend whom Nansen and Johansen met three years later when they again landed at Vardö. Mohn superintended the meteorological equipment, verified the instruments, and planned the meteorological work. It was, therefore, eminently fitting that he should also work up the results, to which labour he has given several years. In the preface the leader of the Expedition also pays a well-merited tribute to Capt. Scott-Hansen, who superintended the meteorological work during the voyage, "thanking him once more for his faithful work during the long polar day and the long, cold polar night."

The meteorological observations embraced the following: Direction and velocity of the wind; pressure; temperature; humidity; amount; form and motion of the clouds; kind and amount of precipitation; direction of motion of the waves; state of the sea; temperature of sea-surface, and phenomena of occasional occurrence. The interesting facts should not escape notice that not only were the observations made with extraordinary care and regularity throughout nearly three years—there being hardly a break in the record—but that the conditions were remarkably uniform, in that the surface was of a homogeneous nature—viz., an ice-covered sea, with a free horizon, and with continents and

islands only at a considerable distance. After the return of the *Fram* the instruments were compared with standards. The volume begins with a description of the instruments and the mode of using them (pp. 3-22), together with the reduction of the observations; then follows a tabulation of the reduced values (pp. 25-248), and finally the results deduced from the observations are discussed (pp. 251-539). There are also discussions of *The Temperature of the Polar Ice* (pp. 540-569); *The Distribution of Atmospheric Pressure and Temperature of the Air Around the North Pole* (pp. 570-576); *Barometrical Depressions and their Motion* (pp. 577-587); *The Diurnal and Annual Periods of the Meteorological Elements in the Arctic Circumpolar Sea* (pp. 588-608). There are also added the observations made during the famous sledge expedition of Nansen and Johansen, and at the winter hut on Franz Josef Land (pp. 609-653).

The volume contains so much of interest that we are at a loss to know what to omit in calling attention to the more noteworthy points brought out in this study. The wind is the first meteorological element to be considered. In order to find the diurnal period of wind-direction three groups of seasons were made—(1) dark, (2) sunny, and (3) equatorial, with regular day and night. In the dark season the wind generally shifts against the sun; in the sunny season it generally veers with the sun, while in the equinoctial months the wind, as a rule, veers with the sun, during the night and morning, and against the sun from 10 A. M. to 10 P. M. These interesting and striking results will be of value in any future discussions of the diurnal period of wind-direction. Dr. Mohn does not, at this point, attempt to explain them. The velocity of the wind, as usual, shows a diurnal maximum about noon; the first annual maximum comes in May; the second in September and October; the velocity is greater in cloudy weather than in clear, cloudy conditions being associated with cyclones. In winter there is almost no diurnal period of wind velocity; in spring the range with clear sky is only one-half the range with sky overcast; in summer the range with sky clear is twice as great as with sky overcast; in autumn (except September) the range is much greater with sky overcast. The conclusion reached by Dr. Mohn is that the diurnal period of wind velocity is influenced rather by the *average velocity* during the day than by the change of radiation in the course of the twenty-four hours. Wind velocities over 34 miles an hour are relatively very rare. The highest observed velocity was 40 miles an hour.

Under pressure, the most noteworthy fact is possibly this, that the barometer rises most frequently with north and northwest winds, and falls most frequently with south and southeast winds. This would accord with the usual easterly movement of cyclones. The reduction of the temperature observations shows the ordinary diurnal period with a minimum in the morning and a maximum in the afternoon in March to September, when the sun is above the horizon during some or all of the twenty-four hours. During October-February, when the sun is below, or but slightly above, the horizon—the dark season—the daytime is usually colder than the night. In December the primary maximum comes about midnight, and a secondary maximum in the afternoon. A greater degree of cloudiness is associated with a smaller range of temperature, and *vice versa*. The disappearance of the solar diurnal period of air temperature during the dark season must be ascribed to other causes than solar radiation, and is probably to be found in the effects of wind, the colder, northerly winds prevailing during the day, and the milder, southerly winds during the night. Such an explanation would also account for the irregularity in the occurrence of the maxima and minima.

Weaker winds in all months except July and August mean lower temperatures, and stronger winds higher temperatures. The southerly winds are the warmest in winter, and the northerly the coldest, and this "goes far to show that the 82nd parallel of latitude is hardly influenced by the Siberian cold pole." In summer the slight difference in temperature of the different winds indicates a weak poleward temperature gradient at that season.

There is a regular diurnal period of the amount of cloud in the seasonal means, the day being more cloudy than the night. In every month the amount of cloud is greater with stronger winds. The winter months are remarkably clear, and the summer months very cloudy. The kinds of clouds were recorded regularly, and show the following general results: Cirrus, most frequent during the day; cirro-cumulus, maximum frequency 2 P. M., minimum about 2 A. M.; strato-cumulus, maximum by day; cumulus, very slightly pronounced diurnal period, maximum near noon and minimum at midnight; stratus, maximum in early morning. True cumuli are scarce, even in summer, and it is doubtful whether the cloud occurs at all in its typical form. The direction of cloud movement averages from west-northwest or northwest. The observations of rain and snow were unsatisfactory, but the amount of precipitation was very small. On July 29, 1895, it rained and snowed all day, and the amount measured on the 30th, at 8 A. M., was 0.75 inch. South and southeast winds are usually the rainy winds; northeast and northwest winds are least likely to bring rain or snow. July has the maximum number of rainy days. Fog does not occur in winter; in summer there is fog on more than every alternate day.

The temperature of the polar ice was observed as carefully as possible. The surface of the ice, in all months except June, is found to be warmer than the air. Being snow-covered for most of the year, the ice-surface is prevented from cooling by radiation, and receives heat from the warmer layers below. Other factors doubtless also enter in.

An important discussion of the pressure and temperature around the North Pole is illustrated by means of monthly isobaric and isothermal charts, in the construction of which all available reliable data were employed. The pressure at the North Pole seems to have its maximum (about 30.080 inches) in April, and its minimum (29.882 inches) from June to September, the annual range being only about 0.20 inch. In the winter months the isothermal charts show a cold pole in Siberia and in Greenland, *and also a third at the North Pole.* A study of the barometric depressions noted during the voyage of the *Fram* shows that the track of the vessel cannot be regarded as a stormy one. Depressions passed on all sides of the *Fram,* with a preponderance of those on the westerly side. In the first winter the tracks are chiefly north of the vessel; in the last they are by far most frequent in the south; in the second they are more evenly distributed, with the larger number on the west. The average track is nearly due east. The average rate of progression is 27 to 34 miles an hour.

In his discussion of the meteorological periods in the Arctic, Dr. Mohn considers the various factors which may control the periods which have been discovered, and this portion of the volume is in many respects the most important. Time fails, however, to summarize these conclusions, which are obviously of more interest to the working meterorologist than to the general reader.

Much interest also attaches to the observations made on the famous sledge journey, and at the winter hut. Through storm, and cold, and night, and all manner of hardships and privations the records were faithfully kept with a per-

sistence and a courage bordering on heroism. Let us hear Nansen (p. 613): "We had no lantern for the reading of the thermometer, and I tried in vain to construct one which would not burn more oil than we could afford to use. But our eyes, of course, became gradually trained to see in the dark, and even in midwinter, with no moonlight, there was so much light (star-light?) reflected from the snow that the column of the darkly-coloured metaxylol was dimly visible, and also the figures of the thermometer-scale, but not the division marks. . . . I do not, therefore, consider it advisable to pay too much attention to the temperature observations during the darkest time, December and January, when the moon was not above the horizon."

Let this quotation, which expresses the spirit of the volume before us, serve as a conclusion to a very inadequate notice of one of the most important recent publications in meteorological science. R. DEC. W.

The Saint Lawrence, its Basin and Border-Lands. The Story of their Discovery, Exploration and Occupation. By Samuel Edward Dawson. xl and 451 pp., 42 woodcuts and half-tone illustrations, including early Maps, Bibliography, Index, and large Map in Colours. Frederick A. Stokes Company, New York, 1905. (Price, $1.60.)

Dr. Dawson is well known for his earlier geological writings. The present book is his most comprehensive work. It is a thorough, critical, and interesting study of the discovery and exploration of the northeast coast of our continent and of the wide transverse valley of St. Lawrence to its western limits in the heart of North America. Territory not now British is, in the main, excluded from this history.

The narrative is preceded by an excellent geographical sketch, giving the general features of the regions concerned. The sketch is drawn with skill and marked by a few generalizations, clearly put and very concise, as space was evidently lacking for detailed treatment in this descriptive introduction. The following quotations will show the quality of these generalizations.

> The peculiar "V"-shaped course of the main river [St. Lawrence] valley is due to the fact that the primary Laurentian nucleus of the continent is of that shape, and, along its edge, in an alluvial valley resting on Silurian rocks, the river flows and expands into broad lakes.
>
> The characteristics of the Laurentian country, which forms and feeds the great river from the north, are very marked. It is a plateau, two or three hundred miles wide, of ancient hills or mountains 1,000 to 1,600 feet above the sea, rounded in form by the immense lapse of ages and forest-clad to their summits. Myriads of lakes connected by countless mazes of streams gather up the waters which flow down to the lower level in rapids and falls along the entire edge of the valley. At the heads of the streams and their tributaries the waters interlock so that, in the early days of the colony, the Indians would pass from one to the other and bring their furs to market by the Ottawa, St. Maurice or Saguenay, according as one or the other was free from hostile Indians.

This geographical sketch is supplemented with a fine orographical map by Bartholomew, which graphically shows these and other surface features noticed in the text.

The reason is plain why exploration in this vast region was long more vigorously and fruitfully pursued than in other parts of the continent. Explorers here met no such barrier as the ranges of the Appalachians, which so long retarded discovery farther south. They found easy access up the valley to the fresh-water seas, across the portages to other basins, and on to the Mississippi itself. These great explorations were replete with geographic and historic interest and abounded with romantic adventure; and the author tells the story well, for he is in full command of these rich resources for book-making.

He deals critically with the work and the value of the work done by each explorer along the coast and up the valley, and he follows them to the water-partings between the St. Lawrence and other rivers that go to join the Atlantic to the north or south of the St. Lawrence Basin. This inquiry leads him here and there into portions of the United States.

He deals also with the difficulties presented by the old maps and charts, portions of a number of which are reproduced. Many readers, if they will carefully peruse Chap. 1, may derive a more intelligent idea of these old productions, understand their imperfections better, and learn how they may be utilized in some ways. There was room for so excellent a book as this on the exploration of the St. Lawrence Valley.

Italy. A Popular Account of the Country, its People and its Institutions (including Malta and Sardinia). By Professor W. Deecke. With numerous Maps and Illustrations. Translated by H. A. Nesbitt, M.A. London: Swan, Sonnenschein and Co., Ltd. New York: The Macmillan Co., 1904.

As an antidote to the numerous "travel books" on Italy, as well as to those of a more specialised nature, comes this comprehensive and authoritative account of the country, its structure and surface, its resources, and its folk.

Six chapters, about one-fourth of the book, are devoted to the purely physical aspects of the country, the subjects included being Boundaries, Surrounding Seas, Relief, Geological Construction, Hydrography, and Climate. These pages form the backbone of the book, and their careful reading will well repay one who wishes an intelligent foundation for the special line of knowledge of Italy which he is following. Whoever attempts this will be disappointed at the lack of adequate maps in these chapters. This omission is all the more lamentable, as not everyone has a general map of Italy at hand on a large enough scale to enable him to follow the details of relief, construction, and topography here presented. On page 35 the author refers to "the accompanying geological map"; but this has been omitted, at least from the English translation, with great detriment to its usefulness. The introduction of numerous sketch maps and the condensing of certain technical details in Chapters IV and V would have been desirable in view of the popular character of the book.

Especially noticeable in the pages mentioned above is the scant attention the author gives to showing relations between things organic and inorganic—an omission that is surprising in a land where the responses of organic forms to their inorganic environment are so suggestive. It is, however, a satisfaction to note instances in which the correspondence between structure and topography is clearly presented, though these are not as frequent as the recent date of publication would lead us to expect. The following description of the region of the *eocene* marls is illuminating to one who remembers the railway journey from Bologna to Pistoja:

> Rounded gentle slopes, deeply cut valleys with broad pebbly bottoms and dirty muddy water, are characteristic marks of the formation. The rock crumbles after a fall of rain; it is completely broken up by frost and thus easily forms landslips—a great danger to roads and railways, and only to be remedied by alteration of route or by thorough drainage. As a rule, nothing grows on these barren slates and clays but scanty grasses, so that extensive tracks lie nearly bare, allowing free play to the rain, which generates flowing waves of mud which from time to time trouble the country near the Bologna Apennines.

And again:

> This undermining activity of the Apennine rivers is a constant source of danger to all bridges, as walls

of even deep foundation are found insufficient, the supports being carried away from behind or from below. Train traffic is constantly being interrupted in the spring, and for the most part in consequence of the threatened fall of a bridge, or of inroads of mud. In the Apennines near Modena there have been counted during the last three hundred years forty-three large mountain slides of the soaked *eocene* marls and the chalk or the *pliocene* clays and sands.

In the chapter on hydrography the author writes with constant reference to the human activities so long at work in the river valleys and lake basins, and the maps and diagrams are many and excellent. He takes up the characteristics of the rivers of different sections as they are influenced by length and direction of slope and the nature of the underlying rock, contrasts the Alpine and Apennine Rivers, tells of the recent changes in the Upper Arno and the swings of the Volturno, and describes in detail the delta of the Po and Adige, with the vigilant control exercised by man upon their inundating floods of waste. It is amusing, however, to come upon such archaic geographical expressions as "the Arno *broke through* the chain and created the moist plain of Pisa," and "the Tiber *bursts obliquely* through the Umbrian chain." Such expressions recall "the mighty convulsions of Nature," which used to account some fifty years ago for water gaps and other innocent episodes of a river's history. In spite of the fact that Prof. Deecke has failed to interpret the varied elements of the surface of Italy in the light of the recent progress made by investigators of geography, he has done a good service in these early chapters in putting into compact and readable form a wealth of excellent material, from which the reader may be able to construct the different stages in the development of that Italian landscape which has attracted students of all ages to its interpretation.

A very detailed and lively presentation of the natural resources of Italy and of the way these are turned to the account of profit or loss by the Government and by individuals is given in the chapters on Plants and Animals, Products, Commerce and Manufactures, and Political Institutions, and they form a serious contribution to our knowledge of the country. Readers may not agree with some of the author's views as to the causes and remedies for the evils which exist in Italy to-day, but they will get valuable information as to the economic and social conditions of modern Italy, though the picture would have been truer if more emphasis has been laid on the steady, if slow progress which the nation is making toward higher ideals of self-government and individual responsibility. Among the many excellent descriptions in Chapters VIII and XI may be mentioned those of the olive tree, the wild flowers, the vintage, and the life and surroundings of the miserable charcoal-burners.

By far the longest chapter in the book is that entitled Topography, and there is scarcely a place or district of any importance that is not here described with evident appreciation of the charm that a beautiful setting has lent to the impressive history of this peninsula. It is here that we first find the geology, geography, and history, not treated as isolated phenomena, but woven into a well-presented summary of the separate indictments of the previous pages. It will probably astonish the reader that the author sees in the present aspect of the Forum only "a miniature desert," and in the palaces of the Cæsars "only a dreary, hot, and dirty waste of rubbish"! Opinions differ; they are not conclusions to be verified. The statement, however, that Orbitello is "as unhealthy a town as there can possibly be, almost abandoned in summer on account of fever," cannot be accepted without investigation, since so great an authority on Tuscany as Mr. Carmichael says:

The climate of Orbitello is sweet and healthy. The citizens of Grosseto flock here in the summer months, for their own city has become dangerous.

The author's discriminating account of the varied elements which make up the population, the differences in speech and manners, work and pleasures which these entail, will be read with pleasure and profit. A slight sketch of Italian history and art round out the completeness of this volume.

While the translator has in the main done justice to the author, he must be censured for many awkward sentences, for faulty punctuation, and for numerous errors due, evidently, to careless proofreading. Thus the omission of a cipher in the statement of the capacity of the Coliseum reduces it to about the size of the Mormon Tabernacle; Monte Mario masquerades as Monte *Maria;* the genitive of Nerva is written *Nerviae,* possibly to conform to *Trajani* and *Augusti,* which precede it; *east* and *west* are several times confused, and there is more than one instance where reference is made to a wrong page. The familiar line of Horace is printed on p. 387: Vides ut *alte* stet nive candidum. It is useless to speculate on who is to blame for the remarkable use of the apostrophe in the title on the cover. The printer's devil does not work in refined gold or he might be the scapegoat; perhaps, as the book bears the imprint of a London house, it is an Anglicism not current in America.

The latter half of the volume abounds in full-page illustrations, many of which are printed from recent cuts and are clear and satisfactory, and the numerous sketch maps in the last chapter do good service in expounding the text. There is a good index, some interesting tables of statistics, and an excellent summary of the essentials the author has tried to emphasize. The book deserves to win a place as a valuable all-round authority on Italy. C. W. H.

Vorläufiger Bericht über eine in den Jahren 1902 and 1903 aus geführte Forschungsreise in den zentralen Tian-Schan. Von Dr. Gottfried Merzbacher. Gotha, Justus Perthes. 1904. (P. M. E. Nr. 149.)

The author's explorations in the Central Tian-Shan have enriched our knowledge of that region with a considerable number of most important facts. In the first place must be mentioned his search for the Khan Tengri Mountain, which has resulted in his ascertaining, for the first time, the actual location of the dominating peak of the Tian-Shan. It differs quite considerably from that assumed by former visitors of the country, and even from the data of the official Russian 40-verst survey map. The author's experiences in trying to get near the mountain furnish in themselves the best explanation why such an important question could remain undecided so long. The peak of Khan Tengri, even in an environment of other peaks about 20,000 feet high, rises so high above all of them (about 3,000 feet) that its characteristic outline appears at the background of almost every valley or glacier in that region, and seems to be the culminating-point of each succeeding range of mountains which one approaches. The author realized that only one who had actually stood at the base of the mountain would be able to say where it is, and therefore resolved to use the means of Alpine sport for the service of science, and, with two Tyrolese guides, climbed over one range after the other, and across one glacier after the other, until the goal was reached. The story of this search for the enchanted mountain which seems to be everywhere and nowhere is one of the most fascinating chapters of geographic exploration. It was found that Khan Tengri is not, as has generally been supposed, the central knot from which the ranges of central Tian-Shan radiate. It rises from a secondary ridge which branches off from the main range at about the place

where the 40-verst map located it. There *is* an imposing mountain at this place, which faces the valley with an almost vertical wall of marble, about 6,000 feet high; but it is not Khan Tengri. The author named it Nicolai Michaelowich in honour of the Russian Grand Duke and President of the Imperial Geographic Society of Russia, who has given so much help and encouragement to the exploration of Central Asia. Khan Tengri, however, while visible back of almost every valley and glacier, as stated above, has its actual basis at the upper end of the Inyltshek Valley and glacier, one of the great longitudinal valleys of the Central Tian-Shan, which opens into the Sarydshas Valley. This glacier, from 65 to 70 versts long, is one of the largest of Central Tian-Shan, and is divided into a northern and a southern branch by the ridge which culminates in the white pyramid of Khan Tengri. The two glaciers in the parallel valleys north of it, the Semenow and Mushketow glaciers, are in no way connected with it. It is from the Inyltshek Valley that an ascent must be made, if it can be made at all, for the snow in the highest part of that region was found to be almost impassable. The climate is so dry that the snow is loose, like sand, and the insolation is not strong enough to start regelation. Névé is hardly ever formed, therefore, and beyond a certain height the fields of loose snow seem to forbid the attempts even of trained Alpinists.

The lack of relation between the general structure of the ranges and the distribution of the highest peaks, of which Khan Tengri is an example, seems to be typical for the Central Tian-Shan; in this, as in many other respects, it differs very distinctly from the Alps, whose principal peaks rise at the crossings of the principal chains. Geologically, the pyramid of Khan Tengri consists entirely of rocks of sedimentary origin; granites, gneisses, and cristalline schists having been found nowhere in the Central Tian-Shan. In the Khan Tengri region, as elsewhere in that neighbourhood, granites and metamorphic rocks do not constitute the central ranges, as they do in the Alps; these ranges consist entirely of limestones, marbles, slates, with occasional intrusions of basic rock, mostly diabase. A band of black diabase, for instance, runs all around the white marble pyramid of Khan Tengri, adding greatly to the beauty of its appearance. The dip of the strata, which is northerly in the ranges north and southerly in those south of Khan Tengri seems to indicate that the mountain itself is a remnant of an old anticline which was broken by dislocations along its periphery and of which the centre alone has remained standing. The generally parallel structure of the ranges of the central Tian-Shan, as observed by others before him, has been confirmed by Dr. Merzbacher's observations; his geologist further succeeded in defining the age of the peripheral ranges north and south as Lower and Upper Carboniferous, respectively, and the valley formations as Tertiary.

The travels of the author along the southern foot of the Tian-Shan enabled him to correct another erroneous geographic tradition. He found that the southern slope of the mountains toward the Tarim Basin is not at all abrupt and "wall-like," as had been supposed by most geographers, but that steep slopes, wherever they do exist, are the exception rather than the rule. In general, the parallel chains of the Tian-Shan slope quite gradually toward the plain, each following range being lower than the preceding one, and the transverse ridges adapt themselves to their grades. That erroneous impression can have arisen only, according to the author, by the prevailing haziness of the atmosphere, which is very apt to create exaggerated impressions of vertical elevation, together with the sharp sunlight of the steppe, which also has a deceptive influence in this respect. As he traversed the country early in spring, at a time when neither of

these influences was developed to any extent, he was able to get more accurate impressions than his predecessors, all of whom visited that region later in the year.

Finally, he ascertained that the lower course of the Sarydshas River, which collects the waters of the central Tian-Shan toward the Tarim River, is not identical with the river coming down through the Dshanart Valley, as had been supposed, but that it corresponds to the river known to the natives as Kum Arik (channel of the desert), which breaks through the parallel ranges in a deep transverse valley, so narrow as to be absolutely inaccessible when the river carries the full amount of water. As this is the case throughout the warm season, the river being supplied by all the glaciers of the central Tian-Shan, only a midwinter expedition would be able to enter that valley and trace it up to the explored parts of the Sarydshas course.

The study of glaciers and valleys also formed an important part of the programme. Like others before him, the author found evidences of an extensive glaciation everywhere. The present glaciers seem almost stationary, since the large supply of snow from the highest regions will replace any amount of loss due to melting at the base of the glacier; only on the Mushketow glacier were slight traces of recession noticeable. A peculiar feature of all the glaciers in the neighbourhood of Khan Tengri is the innumerable ice-lakes which they contain—funnel-shaped, and from 600 to 1,000 feet "large" (the author does not explain whether this means diameter or circumference)—whose origin is still to be explained.

A large-scale map and two beautiful mountain panoramas made of 8 x 10-inch plates are great helps to a proper appreciation of the text, and both text and illustrations make the reader look forward to the publication of the complete report, which is to follow upon this preliminary one. M. K. G.

Reisen im westindischen Mittelmeer. Von Dr. Georg Wegener. Berlin, 1904. Allgemeiner Verein für deutsche Litteratur.

The book is a collection of letters containing records of the author's travels in Central America, which were written originally for the "Tägliche Rundschau" at Berlin. While not claiming to be scientific (as shown by the choice of the publisher and by its origin), it belongs to the best that has been written in the line of light geographic literature, whose principal value consists in awakening the interest in geography among the wider reading public, and for being pleasant reading it is no less rich in reliable information about the places visited. The list of the latter comprises the island of St. Thomas, Martinique, and an ascent of Mont Pelé, together with an account of its eruption on March 26, 1903; Jamaica, the Colombian cities of Puerto Colombia, Barranquilla, and Cartagena, Panama and the Canal region, Costa Rica and its capital San José, and an ascent of the Costa Rican volcano Irazu. The author's well-known skill in portraying, in short sketches, the characteristic features of the countries and nations visited is entirely up to the mark of his former publications, and even the professional geographer who will spend an hour of leisure with him will not lay the book aside without feeling indebted to the author for some new sidelights on otherwise familiar subjects. M. K. G.

Historic Highways of America. By Archer Butler Hulbert. Vols. 8–16. The Arthur H. Clark Company, Cleveland.

Vols. 1–7 of this series were noticed in this BULLETIN, Vol. 36, page 54, 1904. The work is now complete, and calls for a reference to the remaining parts. Vol. 8

deals with the Military Roads of the Mississippi Basin, and the conquest of the old Northwest, as accomplished by the expeditions of George Rogers Clark, Harmar, St. Clair, and Wayne, between the years 1778 and 1794. In view of little previous attention to the actual route followed by Clark, the author attempts a careful identification of various points on the line of march.

A passage from Clark's memoir shows that he hurried to cross the flooded grounds of the Little Wabash, not only in patriotic ardour to reach Vincennes, but that his men might see all hope of retreat cut off, and prefer to meet future danger rather than encounter again the sort of hardship which they had already endured. The following maps are reproduced: Hutchins's Sketch of the Wabash in 1768 (from original in British Museum); part of Arrowsmith's map of the United States, 1796; Dr. Belknap's Map of Wayne's route in the Maumee Valley, 1794 (original in Library of Harvard University). There is also a sketch map of parts of Illinois, showing routes pursued by Clark's expedition.

Waterways of Westward Expansion is the theme of Volume 9. The preface and opening pages contain some just observations on the importance of the Ohio River. These appeal to the physical geographer, both on account of the extent of basin, the variety of surface, the large rainfall and run-off, and the wealth of resources. To the historian the appeal is equally strong, in connection with the first great westward movement and the subduing of the country within and beyond the Appalachians.

Chapter III consists largely of quotations from "The Navigator," a guide-book to the river and to adjacent regions, published in Pittsburg, in 1801, by Zadok Cramer. Population, towns, products, commerce, and directions for the voyage come in for attention. The "Evolution of River Craft" affords an entertaining chapter, with many features of old life on the river vividly presented. "Three Generations of Rivermen" follows appropriately.

The tenth volume is on the Cumberland Road, commonly known as the National Road, and perhaps it might have been better to use the latter title, owing to the danger of popular confusion with the Wilderness Road, through the Cumberland Gap. This was built from Cumberland, Maryland, westward, connecting eastward with Baltimore and Fredericktown. The author gives the history of inception and construction, and follows with popular and interesting details about the coaches, freighters, mails, and tavern life of this great highway.

Volumes 11 and 12 are devoted to "Pioneer Roads," and Volumes 13 and 14 take up "Great American Canals." The Pioneer Roads form two rather miscellaneous volumes, containing much interesting material, but betraying the lack of order and organization, which is too characteristic of the series as a whole. There are chapters on Braddock's Road, the Genesee Road, the Catskill Turnpike, and "Dickens on Pioneer Roads," the last being mainly quotations from Dickens' *American Notes*, evincing the author's passion, if such it may be called, for wholesale quotation. This aspect of the series tends to make it a source of history rather than a history.

The volumes on the canals have much more unity, one being given to the Chesapeake and Ohio Canal and the Pennsylvania Canal, while the other is wholly about the Erie Canal. It can hardly be said that the last will serve as a final history of the great ditch, but it is certainly the one available, and therefore most welcome, story of this large work of the Empire State.

Volume 15 is on The Future of Road Making in America. This, too, is but a fragmentary treatment, as a kind of supplement to the whole. It deals briefly with the recent movements for the improvement of earth roads, including Government co-operation, the meaning of good roads to the farmer, and a closing chapter on

Stone Roads in New Jersey. Volume 16 is given up to an index, a valuable addition, as giving a clue to the great mass of material, which too often seems unrelated and discontinuous.

As a whole, these later volumes of the series perhaps show less tendency to pad with undigested source materials, and are more adequately illustrated as regards maps. This reviewer sees, however, no reason to change the opinion formed by examination of the earlier volumes, that the series, while valuable and almost indispensable to students of American geography or American history, is not as thorough, orderly, and useful as the subject demands. While we recognize a distinct debt to Mr. Hulbert for the large work which he has done, we could wish it done with less haste, in fewer volumes, and at one-half or one-third of the cost to those who wish to possess the work.

A. P. B.

Dar-Ul-Islam. A Record of a Journey through Ten of the Asiatic Provinces of Turkey. By Mark Sykes. With Appendix by John Hugh Smith, and Introduction by Prof. E. G. Browne. xviii and 294 pp., 73 pictures, 22 maps, and Index. Bickers & Son, London, 1904. Imported by Charles Scribner's Sons, New York. (Price, $5.)

The travels here described embraced the most of Anatolia (including Armenia) and Syria as far south as Damascus. Dar-ul-Islam means "The Home of Islam." Many of the descriptions relate to regions that are little hackneyed in the literature of travel; and the distinctive merit of the book is that it throws light upon the actual conditions now existing in a large part of Asiatic Turkey. The writer's style is sprightly, and his purpose is not very serious; but his book is full of acute observations about regions concerning which curiosity is not yet sated. The tone is that of the following passage (p. 171):

> Who pretends to understand orientals? Few Europeans who have lived among them all their lives would admit that they had fathomed more than their own ignorance. Burton, Burckhardt, and a few others may have known something, but not all. . . . Indeed, it is not a good thing to know too much of orientals; if you do, perhaps you may wake up one morning and find you have become one.

Mensch und Erde. Skizzen von den Wechselbeziehungen zwischen beiden. Von Alfred Kirchhoff. Zweite Auflage. 127 pp. B. G. Teubner, Leipzig, 1905. (Price, M. 1.25.)

The first edition of this book appeared in 1901. It contains seven lectures illustrating, in a striking manner, the relations between man and his physical environment. The titles of the chapters are: 1, "Das Antlitz der Erde in seinem Einfluss auf die Kulturverbreitung;" 2, "Das Meer im Leben der Völker;" 3, "Steppen und Wüstenvölker;" 4, "Der Mensch als Schöpfer der Kulturlandschaft;" 5, "Geographische Motive in der Entwickelung der Nationen;" 6, "China und die Chinesen;" 7, "Deutschland und sein Volk."

OBITUARY.

SAVORGNAN DE BRAZZA.

A cable dispatch received by the Minister of the Colonies, in Paris, on the 15th of September, announced the death of Count Savorgnan de Brazza, at Dakar, on his way home from the French Congo.

M. de Brazza was born January 26, 1852, on board the French ship *Vénus*, in the roadstead of Rio de Janeiro. He was of Italian race, and the family name is said to have been di Brazza Savorgnani.

He was educated in the Jesuit College in Paris, and was recommended by Father Secchi, the celebrated astronomer, to Admiral de Montaignac, and admitted in 1868 to the Naval School at Brest. In 1870 and 1871 he served in the fleet in the North Sea and on the Algerian coast, and in 1872–74, under Admiral Quiliot in America, the Cape of Good Hope, and on the West African coast. In 1874 he received his papers of naturalization, and was sent the next year to explore the Upper Ogowe River.

His companions were Dr. Noel Ballay and the naturalist M. Marche. The work of this expedition, which occupied three years, was completed by two explorations in the years 1879–1886, and the Colony of the French Congo, as now constituted, with an area equal to that of California, Nevada, Oregon, and Washington, is practically the creation of de Brazza, and his gift to France. Throughout his career as explorer and as Commissioner of the Government of the Republic in West Africa, his course was marked by decision and tact and humanity. He practised in his relations with the Africans the principles set forth in his own words:

> these primitive people are not difficult to manage, if we avoid offending them and steadily maintain in our dealings with them an attitude of firmness, and good will without weakness, and an unlimited patience.

The death of such a man as de Brazza, at the age of fifty-three, may well be called untimely, though he had already won his place among the founders of civilization in Africa.

TUTUILA (SAMOA)

BULLETIN

OF THE

AMERICAN GEOGRAPHICAL SOCIETY.

Vol. XXXVII **1905.** **No. 11**

AMERICAN SAMOA.

BY

FRANK TAYLOR CHAMBERS, C.E., U. S. N.

The Samoan Islands lie between the 169th and 173d meridians of west longitude, and between the thirteenth and fifteenth parallels of south latitude. The group consists of a number of small islands, but only Savaii, Upolu, Tutuila, and Manua are of any importance. The first of these is the largest, having an area of about 700 square miles, but its surface is so rugged that it is said certain portions have never been penetrated. It is Upolu, with an area of about 550 square miles, which furnishes the bulk of the exports, principally copra, or dried cocoanut. Tutuila, with an area of about 55 square miles, is similar in formation to Upolu, and furnishes its fair proportion of the principal export. In Upolu, however, a German company has, for years, had large areas under cultivation, and this, with its much greater size, has given it the advantage of trade.

From 1879 to 1900 the islands were practically under the jurisdiction of Germany, Great Britain, and the United States, though the Consuls of the three Powers, who directed the government, had little real authority beyond the vicinity of Apia, the principal town, which lies on the north shore of Upolu.

It is not the purpose of the writer to enter into the many differences between the representatives of the tripartite Government and the constantly-occurring petty wars between the native factions. Suffice it to say that these matters resulted in 1899 in the appointment of a High Commission of the Powers concerned, which finally decided upon a division of the territory. Great Britain, in return for concessions in the Tonga group, relinquished her share to Germany, which, therefore, was awarded by far the greater portion—*i. e.,* all

those islands lying west of the 171st degree of west longitude, the United States taking all lying east of the same meridian. This country had, since 1878, possessed treaty rights to the principal harbour;

GOVERNMENT STATION FROM HILL BEYOND FAGA TOGA.

that of Pago Pago, which nearly severs the island of Tutuila. In fact, for some years it had had a coal pile there, and, at the time of

the appointment of this High Commission, had begun to establish coalsheds and wharf of substantial character.

On the seventeenth day of April, 1900, the United States flag was formally raised on the island of Tutuila and government assumed over that part of the group now recognized as American Samoa. Coming, at it did, so soon after our occupation of the Philippines, and at a time when our military and naval activities were large, this incident received comparatively little notice here. In Tutuila, however, it was naturally a great event. Pago Pago Bay became a very active centre, the shores and shallow waters became dotted as never before

HIGH CHIEF MAUGA, HEAD OF PAGO PAGO BAY VILLAGES—HIS "TALKING MEN" TO RIGHT AND LEFT. NATIVE HOUSE, WITH CURTAINS DOWN.

with the small boats of the people of more distant settlements, and the capacity of the houses of the surrounding villages was strained to the utmost. The population was highly pleased with the change of government, speeches were made by prominent natives at the flag-raising ceremonies, and a paper, signed by all the principal chiefs, was handed to the Naval Governor expressing satisfaction thereat and welcoming the new order of affairs. There was a general celebration afterwards, consisting of feasting and games of all sorts known to the natives and of many more introduced by the officers of the naval station-ship having that part of the entertainment in charge.

The islands called Tau, Ofu, and Olosega, lying some seventy

miles east of Tutuila, have a combined area somewhat less than the latter, and are generally designated under the group name of Manua. They are of the same general formation as the larger islands, and produce a sufficient quantity of copra to attract periodical visits of the small trading schooners. As these islands lie so far from the larger and more central ones, the inhabitants have held themselves somewhat aloof from the others, have had their own government, and at times have refused to recognize any central authority. These are said to have been the first of the group to be settled, and their high chiefs have even claimed precedence over those of other islands. When informed that the United States had assumed government over them they were at first inclined to demur, but, upon learning that there was no intention to disturb then-present conditions and that their high chief would retain his position, they agreed to the arrangement. As they have not the advantage of a good harbour, there is no reason why they should be disturbed in present habits or form of government, and as, like all other Samoans, they are professed Christians, having their own teachers and church organizations, there is no opening even for the foreign missionary.

Excepting Rose Island, a coral atoll, picturesque enough with its fringe of cocoanut palms around the inner lagoon, but entirely useless from a commercial or naval standpoint, the islands are all of volcanic formation, largely mountainous, and too small in extent to become of much commercial importance from their own yield. First impressions of scenic Samoa are not soon to be forgotten. The islands are brilliant green from water's edge to highest mountain top with the tropical vegetation. Steep as the hillsides are, there is scarce a bare spot to be seen, though an occasional vertical wall of rock defies all but creeping vines to maintain a footing. The varied shades of blue and green of the water from that of the deep sea to the lighter colouring over the reefs, the cresting of the surf, lend a most attractive foreground, while a species of small sea bird, pure white, ever to be seen soaring in pairs against the emerald background of the hills, rarely fails to throw the novice in tropical scenery into an ecstasy of delight. Upon closer acquaintance, the traveller will learn that, underlying the network of trees, there is a mass of vines and undergrowth which renders progress across the islands, except by a few beaten paths, difficult and, without a free use of the knife, sometimes impossible. The mountainous conditions, of course, add largely to the trouble. Despite the small extent of our main island of Tutuila, five miles by seventeen, some of its mountains are of considerable height, the greatest, Matafau, being over twenty-three hundred feet.

The native products are cocoanuts, bananas, mangoes, taro, yams, and breadfruit. Of these, cocoanuts, in the form of copra, are practically the only export. Cacao grows well, but has not, so far, been planted to any considerable extent on the American islands. Owing to the small area available for cultivation, it is unlikely that many white planters will be attracted to settle. Laws established by the three Treaty Powers, and since upheld by the Naval Governor, tend further to restrict the immigration of the white man. These laws were drawn with the purpose of preventing the alienation of lands from the native owners. No foreigner is allowed to purchase real estate from the Samoans, so the only property on the market is that acquired from them previous to the institution of the law. Various schemes have been tried, however, to gain valuable land, the most successful being that of marriage into a native family. The law does provide for the lease of land, and the limit of forty-nine years is set. The natives, themselves, do little planting. Cocoanuts, breadfruit, and taro require no attention, and a few hours of each week spent in the taro and tobacco patches suffice both for the necessities and for luxury. So the life is, on the whole, one of idleness, the people being much more intent upon the organization of excursions to other villages, where the whole party lives for days upon the bounty of friends, than upon enriching themselves by manual work. This, of course, is principally due to the enervating climate, but largely also to the communistic method of life, the earnings of the individual going into the common fund of the family, which does not necessarily consist of blood-relatives. A large family with a good name is a power, and adoptions are often made into it for purposes of strength.

Despite the attractions of some foreign importations, such as cloths and canned goods, it is difficult, and, at times, almost impossible, to secure native labourers even at the rate of one dollar for eight hours. By dealing with the high chiefs, it is possible to get a gang for six days' engagement, changing to a new crowd from a different village for the ensuing week. Even then the work is most indifferent, and the accomplishment for the latter half of the time sadly below that at the beginning. Some petty chiefs usually come in a gang, and seem to hold it a privilege to draw pay while doing little or no work. Strikes have been had, too, and though organized labour is apt to be looked upon as more or less of a civilized institution, advancing in power with the times, it is safe to say that no American trade-union ever held its men more rigidly in line than do the Samoans when they decide to quit work. The trust element also exists, and meetings of chiefs fix prices upon chickens, eggs, and other commodities, enforcing adherence thereto on the people.

The voyage to Samoa is made in thirteen days, the trip being broken midway by an all-day stop at Honolulu, H. I. American line steamers leave San Francisco at intervals of three weeks for Sydney, Australia, stopping at Honolulu, Pago Pago, Auckland, and Sydney. Until the United States assumed control at Tutuila the steamer line had used the harbour at Apia; but this is extremely unsafe in the hurricane season, and the company lost little time after the flag-raising in changing to Pago Pago as a port of entry. This harbour has something of the shape of a shoe, is landlocked, can be

NATIVE GIRLS WITH WAR CLUBS.

entered at any time, and is perfectly safe in all weathers. It is deep, requiring no dredging, and stands to-day ready to furnish anchorage for a fleet.

The natives are a fine-looking race of light bronze colour. While their noses are flat and their lips rather thick, these features are much more comely than those of the Africans. The hair is straight, but its lustre is often destroyed by bleaching with lime, secured by burning the coral rock. It is a common sight to see heads plastered

white with the lime on Saturday as part preparation for the Sunday toilet. The men are large in stature, often over six feet, and the development of the torso is especially good, due, no doubt, to the constant use of the rowboat and canoe. Every young man, before he is recognized as a warrior, must be tattooed; and though the missionaries have tried to stop the practice, it still goes on without check. However, the candidate sometimes finds it expedient to visit another island to secure the decoration. As the design is nearly continuous from waist to knee, and presents much of the appearance of a pair of blue knee breeches when complete, it can be readily understood that the artist requires several days for the work. The operation in itself is quite painful, and when, as is customary, the victim has his lacerated skin bathed in salt water, no little is added to his discomfort.

The young women are often quite comely, but, like most of their sex in the tropics, soon lose their good looks. The Samoan takes but one wife at a time; but the process of divorce is simple, the husband having only to send his wedded partner home to her people, and, though all the natives profess Christianity, the missionaries have never succeeded in entirely stopping this practice. These missionaries have long since reduced the language to writing, and given the race a Bible and a dictionary, with other books of educational value.

The language is rather difficult to learn, and this the more so as there are two distinct methods of speech, it being decidedly bad form to use many of the words of the common people in addressing a high chief. Oratory is a fine art, and the position of chief talking-man, which is hereditary, is second only to that of the highest chief. Eloquence is by no means uncommon and is much in demand, as most of the affairs of the community are settled by conferences of the chiefs. The houses consist of thatched roofs, of dome shape, supported on posts about five feet high, and it is a common sight to see the orator leaning upon a tall staff, the mark of office of the talking man, haranguing the assembled *fono* from a distance. Though he stand on the opposite side of the village square from the guest house in which the chiefs are assembled, woe to the man, woman, or child who dares cross between the speaker and his audience.

The Samoans usually consider a marriage with the white man advantageous, and from the observations of a year's residence in the islands, it would appear that, with the continued influx of Americans and Europeans, the native blood will quickly become mixed. A taste for the dress of civilization is already spreading rapidly, and in all probability it will be but a short time until the Samoa of Stevenson, except for its picturesque hills, will be a thing of the past.

YOUTH, MATURITY, AND OLD AGE OF TOPOGRAPHIC FORMS.

BY

DOUGLAS WILSON JOHNSON.

The application of the terms "youth," "maturity," and "old age" to the progressive stages in the development of topographic forms has proved so helpful to a proper appreciation of the significance of many of these forms that all students of physiography are justly grateful for their introduction into physiographic terminology. In discussing the use of these terms with classes making a study of topography, I have found certain misapprehensions apt to arise unless specially guarded against.

It seems to me important to emphasize the fact that the terms in question are used by physiographers to indicate certain *stages* of development, rather than degrees of *age* as measured by the lapse of time. Because in the case of man stages of development termed youth, maturity, and old age are usually characteristic of certain periods of years, we attach considerable importance to the time element in the interpretation of the terms. That there is a difference between *stage* and *age* is apparent when we say that "some children mature while yet quite young," or that "a man ages rapidly." If this difference in the possible interpretations of the terms youth, maturity, and old age is brought clearly to the attention of the student, and he is made to see that the terms as used in physiography refer to stages rather than to age, he will have no difficulty in recognizing that a stream may be young where it cuts across a band of hard rock, and mature both above and below, where the rocks are soft, notwithstanding the fact that all of the parts of the stream in question may have existed for the same length of time. This distinction has, of course, been made by those who have used the terms to such good advantage in the past, but seems to require special emphasis when brought before the student for the first time.

In a paper on "The Geological Dates of Origin of Certain Topographic Forms on the Atlantic Slope of the United States," * Professor Davis makes clear the meaning of "age" terms when used in a geographic sense. He says:

When topographic forms are thus described, age is not to be taken as a measure of time, but only as indicating the degree of development of the region concerned: a mushroom may grow old

* Geol. Soc. Am. Bull., 2, 1891, 545-584.

while an acorn has not advanced from its infancy: a low, weak mass under plentiful rainfall may soon be reduced nearly to baselevel—that is, to a nearly featureless peneplain—while in another part of the world a very hard mass in a dry climate might scarcely lose its constructional form in the same time. One would have become old in the same measure of absolute time as that marking the youth of the other. The two might have the same geological date of beginning, but one would become geographically old while the other was still geographically young.

Some difficulties have arisen as a result of the application of the terms youth, maturity, and old age to the general topography of a region, rather than to the individual features which go to make up that general topography. Remembering that these terms are applied

FIG. 1.—YOUNG STREAMS IN YOUNG PLAIN.

LASALLE QUADRANGLE, ILLINOIS. SCALE: ABOUT 1 MILE TO THE INCH. CONTOUR INTERVAL 10 FEET.

to stages in the development of topographic features, and that different topographic features have totally different methods of developing, it will appear that confusion might easily arise if we try to classify a *region* characterized by diverse features as young, mature, or old. For example, the development of a river from youth to maturity is characterized by the establishing of a graded course, the retreat of the valley walls, the formation of a floodplain, the acquiring of meanders, etc.; the development of a plateau from youth to matur-

ity is marked by the progressive dissection of the plateau, more and more of the plateau surface being lost as the branching streams remove the rock, until that surface is nearly or quite destroyed.

Now, it is conceivable that a large volume of water flowing across a newly-elevated plain or plateau might develop a mature valley before the plain or plateau on either side had suffered any marked dissection. We would then have a mature stream valley cut in a young plain or plateau. To speak of such a case as an example of either youthful or mature topography, without further designation, would hardly be correct.

On the other hand, it is possible for a plateau region to be thoroughly dissected by an intricate network of streams, the streams having steep-sided, narrow valleys, but having branched so extensively that the former level surface of the plateau is nearly or quite destroyed. We would then have youthful stream valleys in a mature plateau. Such a region has been called a region in maturity. From the standpoint of the plateau this would be correct; but from the standpoint of the stream valleys the region is one of youth. Unless the beginner has some other means of knowing what is referred to, the statement that such a map represents a region in youth or maturity might cause no little misunderstanding. It is necessary clearly to understand that the entire topography of a region need not develop uniformly from youth to maturity and old age, but that the various elements of that topography may have different modes and rates of development. For the sake of clearness, it seems better to recognize the various elements of a complex topography separately, even where they happen to be in the same general stage of their several developments.

It is interesting to compare the extreme youth of a river with its extreme old age. It would seem that we are less familiar with types of these two stages of stream development than we are with the intermediate types. The first stage is so exceedingly short that we do not find many streams in that stage at any given time. The old age of a stream is so exceedingly long that before a stream can become well advanced in that stage some interruptional force such as crustal elevation, intervenes to change the whole process of development or start a new cycle.

The conditions under which streams may have their beginning are so diverse that it is unsafe to assume any one type of extreme youth as normal, regarding other types as abnormal. If water finds itself compelled to flow down the irregular, hummocky surface of morainal topography, the first stages in the development of streams

in that region will be marked by features quite different from those characterizing the first stages of stream development where water finds itself flowing down the even slope of a coastal plain; but in each case the features may be perfectly normal for the region in question. As a rule, some of the water which traverses land-forms for the first time has been collected into definite streams on adjoining

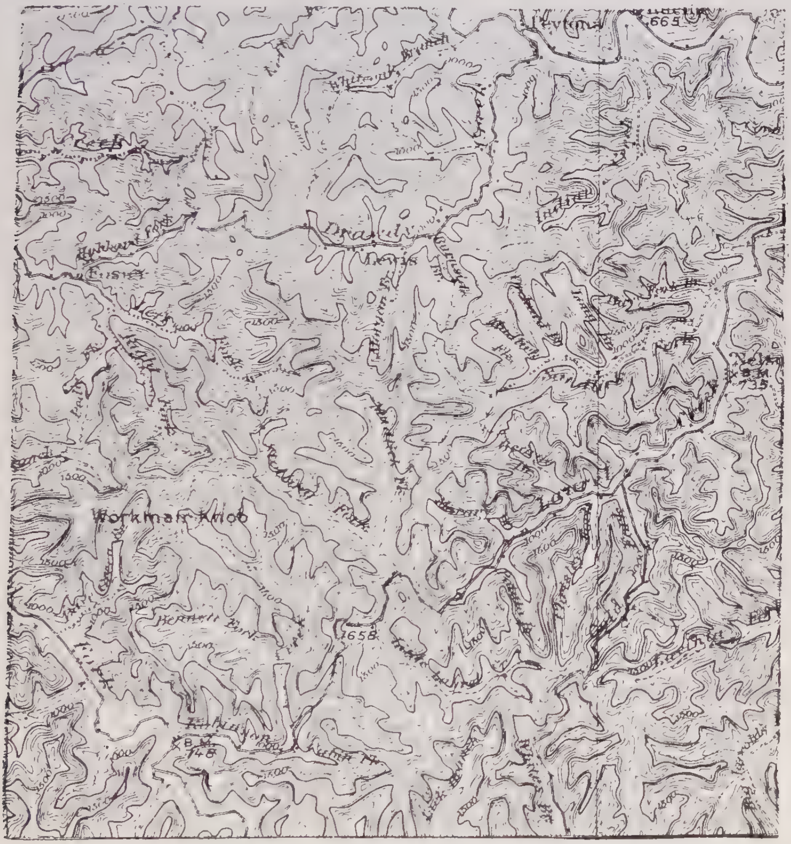


FIG. 2.—YOUNG STREAMS IN MATURE PLATEAU.
CHARLESTON QUADRANGLE, WEST VIRGINIA. SCALE: ABOUT 2 MILES TO THE INCH.
CONTOUR INTERVAL 100 FEET.

preëxisting regions, and so finds its way across the new region in a concentrated amount from the very first. The features normal to the streams developing under these conditions may be different from those normal to streams formed wholly by the run-off of the new region alone. Thus the streams which flow from the "old land" area out across the sloping surface of a coastal plain to the sea have

unusually straight consequent courses, and develop mature valleys incised in the plain more rapidly than do the smaller streams developing on the plain itself.

As a result of the marked seaward slope of a coastal plain, the extreme youth of a river formed by a large and concentrated amount of water flowing across the plain from the old land will be different

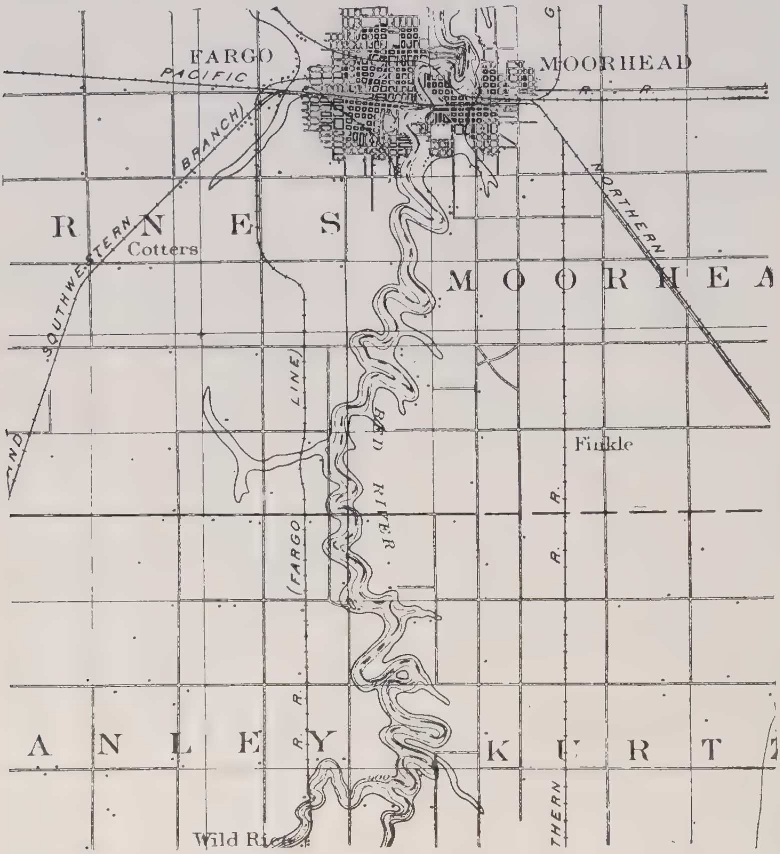


FIG. 3.—EXAMPLE OF A YOUNG PLAIN CROSSED BY A VERY YOUNG STREAM, WHICH HAS ACQUIRED MEANDERS SIMILAR TO THOSE DEVELOPED ON THE FLOODPLAINS OF MATURE STREAMS. FARGO QUADRANGLE, NORTH DAKOTA–MINNESOTA. SCALE: ABOUT 2 MILES TO THE INCH. CONTOUR INTERVAL 20 FEET.

from the same stage of a similar stream which flows out across the nearly level surface of a lake plain. In the latter case the conditions approach those existing on the floodplain of a mature river. There being no definite slope of a marked degree, and the material of the lake plain being more or less fine and homogeneous, the stream is readily deflected by trifling obstacles, and acquires good meanders.

It is thus seen that one of the features most frequently observed in mature or old streams may characterize the earliest stages of youth in a stream formed under certain conditions. Judging from available maps and reports, the Red River, near Fargo, North Dakota, affords a good example of this type of topography. It can hardly be regarded as an abnormal type, but is rather to be considered as one among a number of different types of youth, all of which are equally normal under their respective conditions of development.

Massachusetts Institute of Technology.

THE FIFTEENTH GERMAN GEOGRAPHICAL CONGRESS IN DANZIG.

BY

DR. AUGUST WOLKENHAUER,
Assistant in the Geographical Department in the University of Göttingen.

The German Geographical Congress, founded in 1881 by the well-known African explorer Nachtigal, held its fiftieth meeting during Whitsuntide week in the old and honoured trade town of Danzig, which, with its historical buildings and characteristic environs, must have delighted all the visiting geographers. The local authorities made excellent arrangements for the Congress, which will rank worthily with the meetings held at Breslau in 1901 and at Cologne in 1903. The Fifteenth Congress was particularly interesting because almost all the members of the German South Polar Expedition were present to give their official account of the results of their journey. It will be remembered that the return of the German Expedition to Africa was telegraphed to the Congress at Cologne.

Five scientific sessions were held, with a special topic for each meeting. The first session on Tuesday morning was devoted to the German South Polar Expedition. Professor von Drygalski, of Berlin, the leader of the party, gave a general account of the enterprise. As is well known, the German Geographical Congress, under the leadership of Neumayer, until recently director of the German Naval Observatory in Hamburg, had worked for twenty years to bring about a renewal of Antarctic exploration. At the Geographical Congress held in Bremen (1895) the movement began to take shape. The German Reichstag, later, granted means for the building of the

Gauss, the Expedition's steamer. Von Drygalski said the *Gauss* was the best ship yet built for polar exploration. The equipment of the vessel and the supplies furnished were all that could be desired.

After reaching the field of labour, the *Gauss* was soon caught in the ice, and spent the winter in 66° 2′ S. Lat. and 89° 38′ E. Long.

The staff of the *Gauss* has been severely criticised because its discoveries on land were insignificant, particularly as compared with those of the English Expedition. With regard to these criticisms, von Drygalski said:

> We did not go to the Antarctic for sport or sensational achievement. Our chief task was the solution of geophysical and biological problems.

The discovery of Kaiser Wilhelm II. Land was very favourable for scientific purposes. The characteristics of the Antarctic continent in climate, geology, ice, and fauna are strongly marked there. As the *Gauss* was imprisoned in the ice, 80 kilometers from the land, the opportunities for sledge journeys on land were considerably smaller than those of the English Expedition; and the uniformity of the inland ice made such investigations scientifically unremunerative. On the other hand, the sea presented an abundance of most interesting problems. Particularly fascinating was the combination of physical and biological research methods. In the future exploration of the sea, the Drygalski method of combining these researches will undoubtedly be employed.

The members of the Expedition are still engaged in compiling the results of the explorations, which will be published in one comprehensive work, under the auspices of the Government, by the Department of the Interior. The work will be edited by Professor von Drygalski, and printed by Reimer, of Berlin. There will be ten volumes of text (large 4to) and three volumes of atlases. The volumes of atlas sheets will include the records of the observations of terrestrial magnetism and meteorological phenomena, and also synoptical weather maps. Two parts have already been published. Seventy collaborators are now engaged upon the botanical, zoological, geological, and other results. It is believed that the work will be completed by 1912.

After Professor von Drygalski, other members of the Expedition spoke. Professor Vanhöffen read a paper on "Some Zoogeographical Results." We gather from it that the distribution of earthworms and allied species in the Antarctic regions may be explained, although there is no connection of the Antarctic lands with the sub-Antarctic islands and the southern ends of the continental masses farther north.

It was found that, contrary to the results of observations made in

the northern hemisphere, the so-called warm-water fauna may live in temperatures as low as 1.9° C. The fauna of the Antarctic world has its own characteristic forms, differing from those of the sub-Antarctic coasts and also from those of the deep sea lying between them.

Dr. Hans Gazert, the physician and bacteriologist of the Expedition, gave an interesting account of " The Occurrence and Activity of Bacteria in the Sea."

In the absence of Dr. Philippi, the geologist, Professor von Drygalski read his paper on "Samples from the Sea Floor and Geological-Petrographic Investigations." Many volcanic rocks were found on the mainland (Kaiser Wilhelm II. Land). The Gaussberg is, in fact, a strato-volcano, and not a mountain built up by a single genetic process.

Dr. Meinardus, the successor of the late Dr. Enzensperger (who died on Kerguelen Island), in the preparation of the meteorological results, spoke on the " Wind Conditions at the Winter Station of the *Gauss.*" Entirely different from the observations of the other expeditions (the *Belgica,* the *Southern Cross,* and Swedish parties, for example), those taken at the *Gauss's* station were remarkably uniform and unchanging. East winds predominated both in persistency and strength. North winds were notably rare. Winds of a cyclonic character apparently originate over the oceanic expanse to the north, and are not föhn winds, as was at first conjectured. The uniformity of the winds suggests the probability that there may be a regular and somewhat easterly subsidence of the inland ice.

A report was presented, in conclusion, on the work of the Expedition in the field of terrestrial magnetism. The great need for further investigations in this branch of physical science was, in fact, the impelling motive for the renewal of Antarctic research, and it was on this line that Neumayer carried out the tireless agitation for which we are indebted to him. Dr. Luyken, who was stationed at Kerguelen Island, reported on the magnetic observations there, which were to serve as a basis for similar work at the winter station of the *Gauss.* The records indicate quiet conditions for the most part, while the greater disturbances (very few in number) appear to have intimate relations with seismic and volcanic phenomena.

Some remarks by Dr. Bidlingmaier, the magnetic observer of the Expedition, were particularly interesting. Attention to terrestrial magnetism has unfortunately declined since the day of Gauss. We do not yet understand the rôle which this physical force plays in our globe; and nothing is more important for the advancement of our knowledge of the earth than a solution of the problem of the secular

variation of terrestrial magnetism. As science proceeds in its search for the equivalent of the energy consumed in this secular variation, it may find the connection between this and other branches of geophysics, and begin to learn the nature of terrestrial magnetism.

If such progress as this is possible only in the distant future, because sufficient data have not yet been collected, some immediate results, according to Dr. Bidlingmaier, are possible by carrying out a complete magnetic survey of the earth's surface, by water and land, in the inexpensive way in which Gauss acquired a conception of the potentials of terrestrial magnetism; but this proposed survey would have a double product—the results from the sea on the oceanic, and those from the land on the continental potential. By means of the comparative study of both these potentials we may gain an insight into the properties of terrestrial magnetism as related to that part of the earth between the mean sea depths and the mean elevation of the land surface.

The first session of the Congress gave the members a very agreeable impression of the scientific results of the German South Polar Expedition; and the full account will be looked for with great interest.

The second session (Tuesday afternoon) was devoted to school geography. Headmaster Heinrich Fischer, of Berlin, presented a paper on the work done by the permanent Commission of Geographical Instruction. Through the efforts of the Commission, the Royal Prussian Land Survey will in future sell the large-scale topographic maps to the higher schools at a reduced price. Unfortunately, some present tendencies in education—as, for example, the "Reform Gymnasium"—are not favourable to the teaching of geography. The next three lectures illustrated methods of geography teaching, and dealt with more extended application of mathematical geography in the school course, and especially with the necessity for the introduction of geological studies.

The third session (Wednesday morning) was devoted to Vulcanology. Professor Dr. Sapper, of Tübingen, spoke on "Results of the Latest Researches Concerning Volcanic Eruptions in Central America and the West Indies in 1902 and 1903." This lecture was beautifully illustrated.

Dr. Max Friederichsen, of Göttingen, spoke in high terms of the work of the late Alphons Stübel, the German vulcanologist. His expedition with W. Reiss to South America was made in 1868-1877. The two explorers devoted a year and a half to the volcanoes of Colombia, and four years to those of Ecuador. In Stübel's work,

the "Volcanic Mountains of Ecuador," his famous theory of volcanoes was mentioned for the first time; and this theory is universally accepted to-day in its essential features, particularly so as to "peripherical craters." More disputable points are Stübel's view that the magma itself is the seat of volcanic force, his total rejection of the theory of the connection of volcanoes with the formation of fissures, and his neglect of the factor of erosion in his treatment of the forms of volcanoes—an omission that has often been criticised.

Professor Hans Mayer, of Leipzig, the well-known explorer of Kilimanjaro, endorsed what had been said in praise and in criticism of Stübel's work. Nevertheless, no later explorer of volcanoes had even approximately made so valuable an exposition of the theories relating to volcanoes as that of Stübel. A series of interesting drawings by Stübel, now in the Grassi Museum, Leipzig, was shown.

In conclusion, Dr. Hundhausen, of Zürich, exhibited lantern-slides of many volcanoes in the Red Sea, Java, New Zealand, and Hawaii.

The fourth session had for its topic: "The Morphology of Coasts and the Formation of Dunes." The alluvial formations on the German Baltic coast were first discussed; then Dr. Solger, of Berlin, gave an interesting address "On Fossil Dune Forms on the North German Plain." Dr. Solger showed a series of inland dunes having bow-shaped outlines, the convex sides of which are turned towards the east. He holds that these bow-shaped dunes are the result of the predominance of easterly winds. These easterly winds, according to Dr. Solger's view, were most prevalent in the "diluvial" period, because anticyclonic conditions must have existed over the inland ice of that age; and on account of their "diluvial" origin, Dr. Solger calls them "fossil dunes."

The fifth session was devoted to the "Geography of West Prussia." The great hospitality of the Danzig people and the admirable excursions and entertainments prepared by the Committee of Arrangements added largely to the pleasure and success of the Congress. We refer particularly to the three-day excursion down the Vistula, from the Russian frontier to the sea, which had many interesting features from the morphological, cultural, and historical points of view. A pamphlet prepared for the occasion and an exhibition contributed to further knowledge of West Prussian geography.

All the visitors will look back to the Danzig meeting of the Geographical Congress with the greatest pleasure. The number in attendance was about 320. The next Congress will be held at Nuremberg in 1907.

THE RAILWAY IN NEWFOUNDLAND.

BY

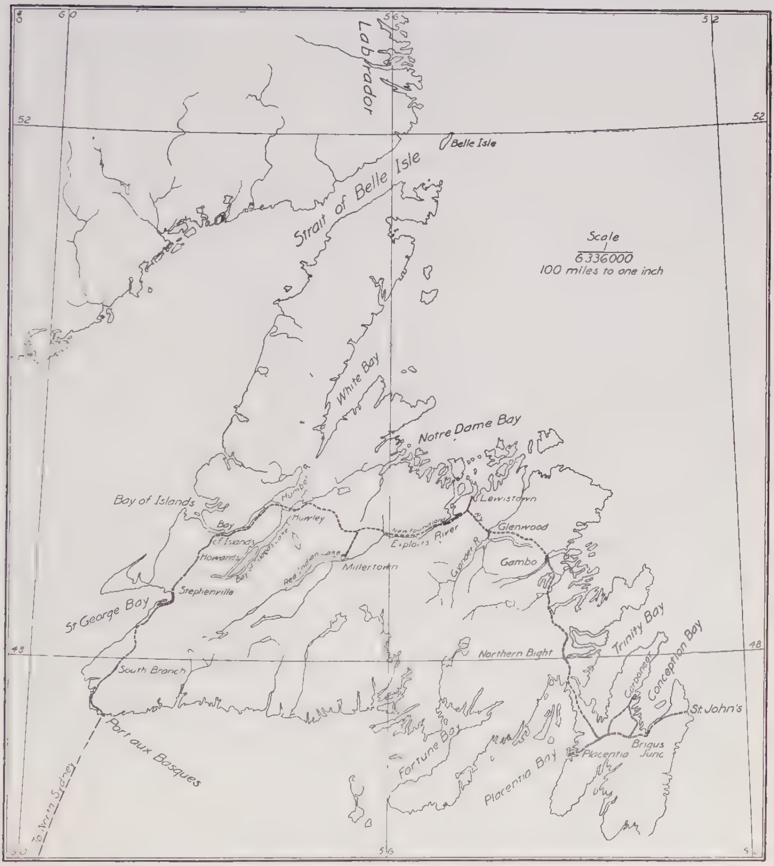
CHARLES M. SKINNER.

Civilized man must breathe uncivilized air and touch uncivilized earth now and again, or pass into the decadence inevitable to men and nations that refuse the healing of nature. Consciousness of this fact and the distress of city living are widening the playgrounds of the earth, and the agencies for reaching them multiply faster than they like who prefer to hold some lands unspoiled. One of the most interesting yet least known of these districts is Newfoundland, that blocks St. Lawrence Gulf, with an area commensurate with that of Ireland and Wales, or of Ohio, and a population of 217,000.

A factor in the future development of this island is the railway, opened a couple of years ago, and now showing a trackage of 638 miles, narrow gauge, yet supplied with most of the comforts expected by travellers, and operating a "sleeper" and "diner" on each first-class train that plies across the island in twenty-eight hours, three times a week, in each direction. The fortunes of this enterprise are still in abeyance, for, built at the instance of Government, it has reverted to the contractor, Mr. R. G. Reid, that he may be reimbursed for the work—a proceeding that has created much discontent. Mr. Reid has released back to the Government, however, the 2,000 miles of telegraph and 3,000,000 of the 5,000,000 acres granted to him, and is seeking Government sanction to sell or lease the road to a corporation. With the solution of the question of ownership and the settlement of the long misunderstanding with France about the fishing rights on the west shore, Newfoundland will compose itself.

Starting at the southwest corner of the island and aiming toward St. John's at its southeastern corner, the railroad makes a wide curve to the northward, describing in 548 miles what might have been covered in 350. Apart from the roughness of the coastal strip and the number of bays, coves, and ravines that could be crossed or looped only at much expense for bridges, there are reasons for this seeming errancy. The bend of the road opens a great forest section; it gives access to hunting and fishing districts; it serves the more important towns; and, mainly, it provides for settlement where it is most likely to be established when Newfoundland enlarges and varies its industries, which are now represented almost solely in fishing. At present only

the coast is inhabited. For a hundred miles at a stretch the train does not cross a road, and, excepting for a water tank or cabin of a section hand, the traveller sees no token of human occupancy save —the pity of it!—vast tracts of burned woodland, gray, ghostly, silent; millions of money wasted, coverts for birds and animals destroyed, the moss charred, the water lowered, miles of fertility made



THE RAILWAY ACROSS NEWFOUNDLAND.

desert. So little is still known of inner Newfoundland that lakes within rifle shot of this railroad are still mapped as conjectural, rivers are undefined by the surveyor, and mountains are named only because they show from a distance. The explorer who gets in his work before or after the flies and mosquitoes do theirs has interesting things to tell us. The great north arm of the island, 150 miles long

and 40 miles wide, is an inviting region, for within its coast-line practically nothing is known of it.* Yet there are no greater difficulties in travel here than in Quebec. The fogs that hang about the shores seldom drift inland or obscure the landscape for more than a few hours.

Newfoundland rises suddenly from the sea on the south in cliffs 1,800 feet high, which are whitened with snow till July. The plateau which they edge extends northwardly in broken ridges, and these hills, with the interlocking river systems and lake chains that fall into the valleys, follow a general direction of southwest to northeast. By interlocking, I mean to define that curious alternation of north and south-flowing streams that is characteristic of this country. It is beside these waters and along these valleys that population will spread when development arrives. Of the 40,200 square miles comprised in the island, only 135 are cultivated. As a native informed me, " We raises our own pattateys, and cabbidges, and turmits," and there are oats and barley, and some small fruits, the half-dozen starved-looking apple trees near St. John's promising no success with the larger ones. Grass grows richly where it has the chance, and it should be a good investment in a part of the world where hay sells as high as $20 a ton, and in the sheltered vales grazing ought to be profitable. If the railroad merely stimulated the dairy interests, it would not have been created in vain.

The stranger begins his journey across Newfoundland at Port aux Basques, reached in a night's journey from North Sydney, Cape Breton. For the first 70 miles he runs between the sea, visible across a sandy, windswept reach, and the backbone of the island, the Long Range, dark, half-timbered, flat-topped, pierced by recesses where last winter's drifts dissolve and cascade turbulently to the sea. Habitations are few and poor, mere shelters often, with hardly an attempt at the "pattateys and cabbidges"; but the timber, storm-bent and stunted, heightens as we turn inland, till, at the lovely Bay of Islands, with its environing domes 2,000 feet in altitude, we are reminded of the forests of the Adirondacks. The land, too, is in better heart, as we see from the gardens, the bits of lawn about the cottages, and the flowers of which Newfoundland has no lack, the glowing thickets of " gold-widow," the white knots of Labrador tea, the blue sceptres of the iris, the nodding pouches of the lady's slipper, the dull red

---

* *The Geographical Journal* for August, 1905, has a paper by Mr. H. C. Thomson describing a six-weeks' journey made with Mr. W. H. Burt through this region in 1904. A map of the route is given.

In the same periodical for October (p. 468) Mr. G. D. McGrigor claims to have discovered camping-grounds of the Beothiks on the shores of Red Indian Lake.

disks of the pitcher plant, the big-leaved "hemlock," flowering white, the daisy, dandelion, and chamomile deserving mention. Never have I seen such a blaze of gold as the buttercups make about St. John's in midsummer, nor finer lilacs than bloom there in that season. The notes of our common birds are heard, and there are no snakes.

With little lift of grade, and following the considerable stream known as Harry's Brook, we strike the Humber, one of the rivers that so nearly split Newfoundland into an archipelago, for if it were sunk a few yards deeper into the sea it would be nine islands instead of one, all with the northeast-southwest axis. The Humber, broad in

THE HUMBER RIVER, NEWFOUNDLAND.

its lower reaches, narrows till we find its black torrent pouring westward through a gorge with tawny precipices overhanging a thousand feet above. We cross its tributary, Grand Lake, 56 miles long, at its foot, and then begins the climb toward the great barrens that roof the island and are feeding-grounds for caribou, which hunters are slaughtering by thousands, and which, like the human aborigines, the Beothuks, are doomed to extermination. The forest we are leaving, and that clothes much of the lower country, is of spruce, pine, fir, and tamarack; but there are fine specimens of birch, some maple, and the deep tangles of elder and various shrubs and field growths of

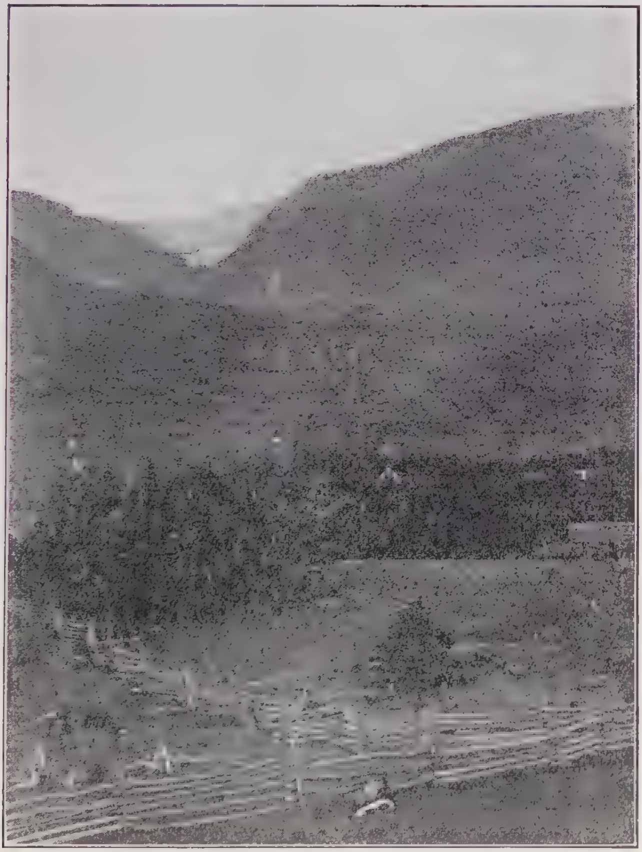
our own country betoken fertility whenever the land shall be claimed for agriculture or for ranching. The wood thins presently, discovering what might be taken for clearings; these spaces widen to fields; and at the fall of night we rise into the vast, cold solitudes where granite *tolts,* or peaks, crouch along the distance, lifting their heads toward the sunset; then the scene fades with an impression of immensity and the northern lights begin to dance.

These barrens are as impressive as the western plains, and resemble them at first glance; yet they differ, except in superficies. The plains are dry; the barrens soggy, and threaded by a thousand rills. The plains are stony and dusty; the barrens, the boulders strewn here and there, are deceptively like pasture. The "moss," as they are also called, is a thick carpet, the woody stems of Indian tea and "goold-widdy" forming a warp, and grass, reeds, and reindeer-moss the woof. This carpet has been thickening for centuries, and although the surface appears dry and invites to rambles, you sink in it to the ankles, and sometimes to the knees. I am told that in a few places it is six feet deep. It holds the moisture which is visited on the island in rains and fogs, and it collects in unseen hollows where a surface growth of blue flag denotes its presence. One needs rubber boots in exploring the barrens, and he finds advantage in following the elk tracks, which avoid many pitfalls that the moss conceals. Yet there is little danger from swamp or quicksand.

The crest of the island, near its centre, is marked by a series of tolts, of which the Topsails and Hodges (2,200 feet) are conspicuous from the railroad, and, in crossing the divide at a height of 1,800 feet or so, one is apt to see white drifts beside the track, in the shadow of the snow fences, as late as July. For, although the cold is less intense than on our Western ranges, snow falls heavily in winter and traffic is stopped for weeks at a time. Gruesome tales are told of the sufferings of passengers when stalled fifty miles from a settlement.

At Dawe, which needs a microscope to discover it as a town, we reach the Exploits River, pouring from its sources in the Annieopsquolch Mountains, with many leaps and much chafing of its hilly shores, toward a bay filled with islands. We follow 40 of the 200 miles of this largest of the Newfoundland streams through wilderness, still unpeopled, then over a brief rise to the valley of the Gander, the streams of this country being often separated by the thinnest of partitions. And descending to these large, calm reaches, which are in marked contrast to the romantic cañon of the Humber, we still find the land clothed with primeval forest; but the hum of the saw-mill is heard in the land, and a tract half as large as New Jersey

will be deforested if the Harmsworth pulp concession becomes effective, to the detriment of the soil and springs—a circumstance overlooked by the people in their hope of gain from the industrial development. There is hardly a break in the wilderness between the east coast and the west for agricultural or grazing purposes, and few present occasions for an interior village, except at the granite quarry



THE VALLEY OF THE LITTLE CODROY, NEWFOUNDLAND.

near the Topsails. Nor need we look for an immediate settlement if the fisheries continue to prosper. They engage nearly a third of all the Newfoundlanders and represent almost the adult male population; still, there are 2,500 farmers, with an average of 34 acres apiece, and they raise cattle, sheep, hogs, and poultry; so that the agricultural idea is implanted, and some day there will be withdrawal

from the bleak, rough coast, with its icy besetment, and devotion to less heroic toil than the pursuit of cod and whales. Here along the Gander, with its fertile alluvium, is room for a million homes.

Crossing Terra Nova River, paralleling the east coast at a height along the hillsides and threatening the isthmus that unites Wales-like Avalon to the rest of the island, the settlements increase in size and number, and remarkable grades and loops are seen in circumventing the incisions which the ocean has made in the land. Not a little of this railroad work has a temporary look; the embankments are too steep, the shelves beside the river too narrow; the bends by which rocks and coves are avoided are too wide; indeed, the bed of the road is laid so rudely that sensitive passengers may experience sea-sickness. Not till we come to Avalon and run the last 80 miles of the trip do we feel ourselves allied to civilization once more, for houses appear in the landscape, property is fenced, and villages are discovered afar by the spires of their churches—Roman, Episcopal, and Methodist, which represent the faith of the colony. Roads, not ill built, wind across the stony hills and through woods of pine. Rarely a house gives token of having been built for more than mere expediency, yet there are few homes in Newfoundland that have the size and architectural importance of our ordinary suburban villas. Conformable to the featureless houses are the railroad stations, where each village assembles to stare at the passengers, but less rudely than in our own " deepos." Indeed, one likes these people for a hearty, healthy, kindly race, poor, ignorant of books, but truthful, trustful, and unspoiled.

Where capital would have directed the cutting or tunnelling of a hill, the railroad zigzags over its top or detours about its flank, and miles will yet be saved through engineering economies; but the building of spurs, of which there are now but four, with a total of 90 miles, will wait the development of resources and the increase of the shore hamlets to towns. St. John's is the only city, and to that the train brings us, landing us at the head of its fjord amid a dubious odour of sewage and a dull outlook on wooden houses, but a picturesque, hospitable, restful place withal. Though in the latitude of Berne, Budapest, and Seattle, it is occasionally blocked by icebergs and floes that the Arctic current lodges at its gates.

Newfoundland invites the tourist because of its air, ocean-purified, ice-cooled; its moderate temperatures, seldom falling below zero or reaching 90°, though the winters are dreaded for their snows and winds; its remarkable scenery, for besides its hills, woods, ravines, caves, and barrens, its sea-wall has been carved by the elements into

a thousand impressive and fantastic shapes, while the icebergs add wonderful forms and colour; and, lastly, because of its restful isolation and simplicity. It invites the hunter and the fisherman but too loudly, for a terrible waste has been committed; yet the elk still haunt the barrens, and the bear and fox the woods, while the streams abound in trout and salmon. It invites the artist, who will discover in the villages nestling in the coves quaint forms in building, and hardy yet sometimes beautiful types of men and women. It invites the geologist and prospector, inasmuch as copper, iron, and some rarer metals are found in paying quantities—gold in amounts that warrant hope of more, coal in seams too shallow for profit yet promising relationship to the great beds of Cape Breton, and fossils and minerals of scientific interest, while the glacial erosions—the great folds, fractures, and intrusions in the rock foundations—deserve study.

But Newfoundland invites more than the visitor; it invites the settler. England's oldest colony is in touch with our markets; its port, the eastmost in North America, is three and one half days from Europe; its woods await the scientific forester; its mines the pick; its fields the plough; its rivers the harness of the manufacturer, miller, and power-maker. The climate is healthy; there is room to grow, and land is practically given away. Pioneer work is to be done for popular education and for internal improvements before the American ideal is reached, and when that occurs the charm of this out-of-the-world place may be dispelled. Yet in the westward set of immigration its development is inevitable, and in the changes that impend the social and industrial dynamic of the railroad must be considered.

GEOGRAPHICAL RECORD.

AFRICA.

Ostriches in the Oudtshoorn District of Cape Colony.—This district of the Cape of Good Hope is girdled with mountains, and so difficult of access that there seemed to be little hope of raising bulky farm products for exterior markets. Its prosperity is a good illustration of adapting human activities to natural conditions. The *Agricultural Journal* of the Cape of Good Hope (Sept., 1905) says that the wealth of the district (which is a little north of Mossel Bay) in soil and water is very great, and that nothing was lacking but cheap transportation. With the development of irrigation it was found that lucerne (alfalfa), the king of fodder plants, grew finely wherever water was procurable; but the cultivation of

this grass would not have reached its great extent if it had not been for the ostrich-feather industry, which has grown to enormous proportions throughout the district. Ostriches thrive on alfalfa.

Until recently the only way to get produce out of the district was by ox wagon over the mountain passes, which made it impossible to establish dairy or other agricultural industries on a large scale. The advantage of the ostrich industry is that the whole crop of feathers from an extensive farm may be carried out in a Cape cart, so that the question of transport does not affect the industry very much. The birds not only thrive on the rich pasturage, but the quality of the feathers is superior. A line of railroad has now been carried into the district; and it is expected that in time not a few of the large ranches, where only flocks of these huge birds are now seen, will produce herds of dairy stock and flocks of sheep.

COMMANDANT LEMAIRE RETURNS FROM AFRICA.—This well-known explorer, who rendered much service to African geography about five years ago by fixing astronomically the positions of a large number of places in the south and south-eastern part of the Congo Free State (BULLETIN, 1901, p. 180), has rendered similar service in the northeastern part of the Congo Basin, and has returned to Belgium after three years' absence. In addition to his official negotiations with the Government of the Anglo-Egyptian Sudan concerning Lado, he collected a very large amount of meteorological, hypsometrical, and botanical data, surveyed an area not less than 4,000 square kilometers in extent, and determined the astronomical positions of 135 places.

TELEGRAPH ON THE CONGO.—Our monthly *Consular and Trade Reports* (Aug., 1905) say that communication by telegraph and telephone has been largely developed along the Congo River within the past ten years. The first telegraph line was established between Boma and Matadi, forty miles, in July, 1895. In September, 1898, communications both by telegraph and telephone were completed between Matadi, the highest point reached by European steamers on the lower Congo, and Leopoldville on Stanley Pool, from which about 100 steamers are plying on the 7,000 miles of navigable waterways on the upper Congo. In 1899 there were 800 miles of wire in use. Since then the long-distance telephone has been perfected, and communications are practicable for distances of about 400 miles. Successful experiments have recently been made with wireless telegraphy.

A TELEGRAPH LINE ACROSS THE SAHARA.—Through the efforts of Mr. Jonnard, Governor-General of Algeria, and the French Ministries of the Interior and the Colonies, an enterprise is now under way which will result in a telegraph line across the Sahara. The *Annales de Géographie* (No. 76) says that Mr. Etiennot, the Inspector-General of the Postal and Telegraphic Services of Algeria, is now selecting a route for the line between Beni-Abbès, to which the Algerian telegraph service has just been extended, and Adrar, in the oasis of Tuat. South of Tuat the line will be extended to the Ahaggar Mountains, in the central part of the desert, from which point it will be carried southwest to Timbuktu near the Niger. The *Bulletin Trimestriel* of the Geographical and Archæological Society of Oran says that the preliminary studies will be completed this fall, and the work of building the line will begin next winter.

COPPER IN KATANGA.—Mr. H. Büttgenbach publishes in the *Annales* of the Belgian Geological Society (Vol. XXXI) a paper on the copper of the Katanga

province in the southeast part of the Congo Free State, where he took part for eighteen months in the work of prospecting. He says the ore deposits are distributed in great quantity over a territory of about 80,000 square kilometers in the basins of the upper Lualaba and the Lufira Rivers. This copper region was first visited by Reichard in 1885, and was studied more closely by Cornet in 1894, and a large amount of research work has been done there since 1900. The region is composed of old sedimentary rocks (sandstone, quartzite clays, conglomerate, and limestone) which, in the ore-producing zone, appear to belong to the upper Devonian and probably also to the Carboniferous. The ore deposits, as far as they have been worked out, are the results of the impregnation of some of the strata with copper salts, especially malachite. The ore runs about 14 per cent. copper. Usually there is only a trace of gold or silver, but in some cases a ton of ore yields 3 grams of gold and 72 grams of silver. As exploration has not yet extended below a depth of 40 meters, it is not known how deep mining may be carried. The paper is devoted chiefly to a description of some of the more important and typical deposits. Reports in the *Mouvement Géographique* for two years past have encouraged the expectation that this copper region may take its place among the great producers of that metal.

Results of the Segonzac Expedition in Morocco.—The Bulletin recorded in the May number (p. 291) the return of the Marquis de Segonzac to Morocco and his capture by Berbers in the southwest part of the country. The *Bulletin* of the "Comité de l'Afrique Française" reports the release of the French explorer, who was able to save his notes and most of his collections, and has returned to France with his companions, Messrs, Gentil and de Flotte Roquevaire. He desired in particular to study the two slopes of the central main range of the Atlas, the connections between this and the middle and Anti-Atlas, and the economic resources and inhabitants of those regions. He went to the headwaters of the Dra, covered a considerable extent of country, and has brought back scientific observations of all kinds. Mr. Gentil studied the geology and topography of the western part of the Main Atlas and the coast region south of Mogador. During his passage of the Main Atlas he discovered the first fossils by which it will be possible to determine the age of the ancient axis of the range in these parts. On the southern slope he found the remains of a carboniferous fauna, and discovered that the granite base of Jebel Sirwa supports well-preserved remains of volcanoes, apparently of Tertiary age. Mr. de Flotte Roquevaire triangulated the Huz and the western part of the Atlas, taking bearings from 66 stations and fixing the co-ordinates of about 300 positions. This work will be most helpful in the future mapping of that region.

The Giant Gorilla of the Sanga.—*La Nature* recently printed the photograph of an enormous anthropoid ape that was killed near the Sanga River, in the French Congo. Dr. E. T. Hamy writes that these large animals have been seen several times in the past year among the valleys of the Lôm and Sanga Rivers. The white men at the German and French stations corroborate this report that an anthropoid of great size lives in the forests along the boundary between the Cameroons and the French Congo.

Mr. Eugène Brussaux, who sent the photograph to *La Nature,* says that the animal appears to be a gorilla, differing from those living in Gaboon only in its enormous stature. Its skull, face, and ears are exactly like those of the gorilla. The specimen that was killed was not less than seven and one half feet in height,

and its body in a sitting position was as high as an ordinary Pahuin native. It was killed near Uessu, the chief station on the River Sanga, and was one of three animals living in the neighbouring forest and which had become known by their large footprints on the ground.

The animal was almost bare upon the breast and stomach, but its shoulders and thighs were covered with thick, long hair. It was about three feet and a half in breadth across the shoulders, it weighed nearly 800 pounds, and eight porters were required to bring it to the station. Mr. Dupont, the Administrator at Uessu, intends to send the skeleton of this unique specimen to Paris. If it is not a new species it is believed to be a new variety of the gorilla. A later report says that another similar specimen has been killed near Bayanza on the Sanga.

AMERICA.

United States Railroads in 1904.—The statistics of railroads compiled by the Interstate Commerce Commission for the year ending June 30, 1904, show a total single-track railroad mileage in the United States of 213,904 miles—an increase of 5,927 miles over the previous year. This increase exceeds that of any year since 1890. The aggregate length of track of all kinds was 297,073 miles. There were in service 46,743 locomotives, classified as passenger, 11,252; freight, 27,029; switching, 7,610. The total number of cars was 1,798,561—an increase of 45,172 over 1903. This rolling stock was classified as passenger, 39,752 cars; freight, 1,692,194; cars employed by railroads in their own service, as gravel cars, etc., 66,615. The number of passengers carried was 715,419,682. The number of tons of freight was 1,309,899,165. The average revenue per passenger was 2.006 cents, the average for the preceding year being the same. The average revenue per ton per mile was 0.780 cent. This average for the preceding year was 0.763 cent.

Road Red Book of New York State for 1905.—This is a timely publication, particularly in view of the amendment to the New York State Constitution at the last election authorizing the State to incur debt for the improvement of highways. The book contains directions for the guidance of highway commissioners in towns that have adopted the money system of working roads, and are thus able to avail themselves of the assistance of the State in the improvement and maintenance of their common highways. It also describes the best methods of making and improving roads, and has many half-tone pictures showing good and poor roads in New York State, and various methods of making them and keeping them in repair. It is *Bulletin* No. 10 issued by the Department of the State Engineer and Surveyor.

Two New Provinces in the Dominion of Canada.—The provinces of Alberta and Saskatchewan were admitted into the Dominion on Sept. 1 last. As is shown by our map giving their boundaries, the new provinces include the former territories of Alberta, Assiniboia, Saskatchewan, and Athabasca. The entire area is bounded on the south by the international frontier; on the east by Manitoba and the 102nd meridian; on the west by British Columbia, the line in the south coinciding with the Great Divide of the Rocky Mountains; and on the north by the 60th parallel, which is also the northern boundary of British Columbia. The 110th meridian was selected as the dividing line between the new provinces, so that Alberta comprises the former territory of Alberta, the western half of Athabasca, and a narrow strip of Saskatchewan and Assiniboia; while Saskatchewan comprises the eastern half of Athabasca and the greater part of the former territories of Assiniboia and

Saskatchewan. Edmonton has been selected as the provisional capital of Alberta in preference to Calgary, and Regina will be the capital of Saskatchewan.

The two provinces comprise a total area of 550,000 square miles, and the population of each is roughly estimated at 250,000. A long-standing request of Manitoba for extension westwards was refused.

The public or Crown lands in the new provinces are to remain in the possession of the Dominion, financial compensation being given for them, to be increased as the population increases. Sir Wilfrid Laurier justified this treatment of the lands by the suggestion that the Government's immigration policy might suffer if it lost control of the unsettled land. The provinces will accordingly receive at once from

CANADA'S TWO NEW PROVINCES.

the Dominion an annual subsidy of upwards of $1,300,000, and this will be increased with the increase of population and land values by a further annual payment of about $650,000.

Pending further legislation, as the Society is informed by Mr. James White, Geographer of the Department of the Interior, the old territorial divisions of Franklin, Mackenzie, Keewatin, and Ungava have been done away with, and these parts of the Dominion are all now included in the North West Territories.

Mineral Products of British Columbia for 1904.—According to the annual *Report* (1904) of the Minister of Mines for British Columbia, the mineral output of that year was valued at $18,977,359—a figure that had been exceeded only in

1901. The yield of placer gold was $1,115,300; lode gold, $4,589,508; and coal and coke, $1,253,628. The total mineral production of the province from its settlement in 1852 to the end of 1904 was $226,201,851, gold supplying nearly one-half of this value and coal and coke over one-third. British Columbia contributes half of the value of mineral output of the country. The report contains details of mining operations in the various districts and a considerable number of half-tone pictures showing mining camps, placer, and other kinds of mining and quarries.

THE MEXICAN FREE ZONE ABOLISHED.—This zone, which was established in 1851 by Mexico along her northern frontier, was abolished on July 1. The Free Zone was briefly described in the BULLETIN for May, p. 288. It was established, as President Diaz says in his proclamation, on account of the isolated condition of Mexicans along the northern frontier, to whom domestic commodities could not be sent cheaply because transportation was difficult and expensive. Commodities from the United States were therefore permitted to be imported practically free of duty, so that the inhabitants of the Free Zone might buy the necessaries of life cheaply and be encouraged to establish industries by procuring raw materials at moderate cost. The various lines of railroad now make it easy to send domestic goods to frontier points, and for this and other reasons the need for the Free Zone no longer exists.

THE U. S. Board on Geographic Names rendered the following decisions October 4, 1905:

CAT: island in the St. Lawrence River, St. Lawrence county, N. Y. (Not Chat, Isle aux Chats, nor Macks.)

* CONNERS: creek, Wayne county, Mich. (Not Conner, Conner's, Connor's, Connors, nor Tremble's.)

CONNERS CREEK: post office and village, Wayne county, Mich. (Not Conner's Creek, nor Connors Creek.)

CRYSLER: island in the St. Lawrence River, St. Lawrence county, N. Y. (Not Chrisler, Dark, nor Lawrence.)

LEMITAR: post office, precinct, railroad station, and town, Socorro county, N. Mex. (Not Lamitar, Lamitas, nor Limitar.)

* MARIANAS: islands in the Pacific Ocean. (Not Ladrone, Ladrones, Mariana, nor Marianne.)

MINNECHAUG: mountain, Hartford county, Conn. (Not Minnechug, nor Minnehaush.)

* SHANTUNG: province, China. (Not Shan-tung, nor Shangtung.)

ASIA.

A NEW PROVINCE IN INDIA.—The Indian Government adopted a resolution at Simla on July 19 by which Bengal was relieved of an area containing 24,000,000 people, or nearly a third of its population. This step was taken to reduce the size of the province in order to admit of more efficient supervision over its growing population. It was decided to cut off the whole of Eastern Bengal, including, besides Dacca and Chittagong, the districts of Rajshahi, Dinajpur, Jalpaiguri, Malda and Chittagong, and to unite it with Assam, as a lieutenant-governorship under the name of "Eastern Bengal and Assam." The area of the new province is 106,540 square miles, with a population of 31,000,000. The capital will be Dacca, with subsidiary headquarters at Chittagong. The typical Mohammedan

* Reversal of former decision.

population of Bengal will be concentrated in a single province, and nearly the whole of the tea industry and most of the jute-producing region are brought under a single Government.

PARA RUBBER IN ASIA.—Agricultural interest in the Federated Malay States is almost wholly centred in the cultivation of the Para rubber tree. The tree is suited to the conditions found there, and its cultivation is proving remunerative. The exports for 1904 amounted to 14,000 pounds, valued at over $28,000. This amount will be greatly exceeded in the near future. It has been found that "Plantation Para" is higher-grade rubber than the wild product.—(Condensed from Board of Trade *Journal,* No. 461.)

DR. WORKMAN'S VIEWS ON HIGH MOUNTAINEERING.—The *Alpine Journal* for August contains a paper by Dr. William Hunter Workman on "Some Obstacles to Himalayan Mountaineering and the History of a Record Ascent," which was read before the Alpine Club on May 16th last. It will be remembered that Dr. Workman ascended to a height of 23,394 feet on Pyramid Peak, which is 24,500 feet in height. This is the record ascent in mountain-climbing. Dr. Workman said that he did not feel at all sanguine that Mount Everest would be conquered in the near future. He believes it cannot be ascended without means of transport superior to any now obtainable and after prolonged sieges, during which the mountaineers will have to meet and overcome not only the physical obstacles presented by the peak itself, but also those offered by altitude, heat, cold, snow, and wind, which become more accentuated the higher the points attained. One great difficulty is that it is almost impossible to force the coolies, who are needed to carry the camp equipment, up to a sufficiently high point to make the tops of these highest summits of the Himalayas attainable. While ascending Pyramid Peak, Dr. Workman was unable to pitch his final camp higher that 19,358 feet. If he could have camped at 21,000 or 22,000 he would, in all probability, have gained the summit instead of turning back 1,100 feet below it. He and his two white companions might probably have reached the top of this great mountain during that afternoon, for the weather was perfect; but the peak would have been their mausoleum, as they could not have regained camp that night, and a night in the open at that altitude would have meant certain death from cold.

He said that in the rarefied atmosphere a person can breathe more freely while erect than when lying down. In camp at 19,358 feet the whole party was kept awake by lack of breath. They would doze off and then awake with a start, gasping for breath. His conclusion is:

> If camps could be established at heights of 23,000 feet to 25,000 feet and above, as they would have to be, sleep might be entirely prevented or interfered with by deficient oxygenation of the blood to such an extent that a party would be incapacitated from this cause alone from going any higher.

EUROPE.

CAVE EXPLORATION IN THE TWENTIETH CENTURY.—The latest number of *Spelunca* (Vol. VI, Part 1), extended to 192 pp., is wholly given to the first part of a work by Mr. E. A. Martel, the well-known cave explorer, entitled "La Spéléologie au XX^{e} Siècle (Revue et Bibliographie des Recherches souterraines de 1901 à 1905"). The activity in cave exploration at present is illustrated by the fact that a bare summary of the work done since the century opened in France alone fills the entire first part of this work. Part 2 will be given to speleology in foreign countries; Part 3 to speleology as applied to various sciences; and Part 4

to speleology as applied to public hygiene (Eaux d'alimentation). The four Parts will fill Volume VI of *Spelunca* for 1905.

Mr. Martel treats each of the cave regions of France in turn, briefly summarizing the new cave discoveries and fresh explorations in caves already visited. Many of the summaries occupy only a few lines each; the longest, given to Padirac, fills nine pages. Exaggerated statements with regard to dimensions of some caves and other facts relating to them are corrected. For example, it was reported in *Le Monde Moderne* in July, 1904, that the galleries of the Ardèche and the Pont d'Arc had a total length of over seven kilometers, while the scientific measurements made by Mr. Martel and Dr. Raymond, thirteen years ago, show less than half that length. The sources of information relating to each cave are at the end of the paragraph or section devoted to it.

A LOCAL GEOGRAPHICAL PUBLICATION.—The *Mitteilungen* des Vereins für Erdkunde zu Halle a. S., published by the Thuringia-Saxony Geographical Union, is an excellent example of a publication entirely devoted to the geographical interests of the small territory in which its members chiefly live. It is an annual. The volume for 1905 contains 125 pages and three maps, and is typographically attractive. The five geographical papers, by W. Ule and others, relate entirely to Thuringia and the province of Saxony. Forty-eight books and monographs, all relating to the home region, are concisely reviewed by Dr. A. Kirchoff, W. Ule, and other well-known geographers. The book reviews are followed by summary accounts of the excursions and meetings during the year, and lists of the members and library exchanges. From the appearance and quality of the *Mitteilungen* the inference seems fair that this Geographical Union and its Year Book are beneficial influences in all that relates to geography in their neighbourhood.

RAINFALL ON BEN NEVIS.—The rainfall on Ben Nevis is discussed by Andrew Watt in the *Journal of the Scottish Meteorological Society,* third series, 1905, Nos. 20 and 21. The nineteen-year period, 1885-1903, is considered. The mean annual rainfall at the summit was 160.8 inches, and that at the foot 78.6 inches. In individual years the amounts at the summit varied from 49 per cent. above to 33 per cent. below the mean, and at the base from 45 per cent. above to 23 per cent. below the mean. Rain falls more frequently but less heavily by night than by day at the foot of the mountain, speaking generally. On the summit the variations are less marked, but accord on the whole with those at Fort William. Falls of 4 to 6 inches a day have been recorded at the summit. R. DEC. W.

POLAR.

NEW COASTS SEEN BY THE DUKE OF ORLEANS.—Early in September news was received in Sweden from Reykjavik, Iceland, announcing that the Duke of Orleans and his party in the *Belgica* (BULLETIN, pp. 493-4) had made a successful voyage north along the east coast of Greenland. The point they were said to have attained is 78° 16′ N., which is about 110 statute miles north of Cape Bismarck, the highest point reached by Payer of the Koldewey Expedition in 1870. The party found that Cape Bismarck is not on the mainland but is part of an island, the indentation which the German Expedition named Dove Bay being in fact a strait separating the island from the mainland. The return of the Duke's party to Belgium has confirmed this report and added very interesting details, which are published in *Petermanns Mitteilungen* for September.

It was found that north of Cape Bismarck the coast is little indented, in which respect it differs from most of the explored Greenland coast, which is more or less deeply dissected by fiords. The new-found coast-line was named Terre de France. The party was able to land on a cape which was named Cape Philippe (77° 36′ N., 18° 36′ W.). Here they found ruins of Eskimo settlements; and this discovery will strengthen the view that at least a part of the Greenland wanderers travelled around the north end of Greenland and down the east coast.

At the *Belgica's* farthest north a wall of ice covering the sea and from 15 to 20 meters in height made it necessary to turn back. The deep-sea soundings appear to show that there is a submarine ridge between Greenland and Spitzbergen. It was thought probable that such was the case when the *Fram* returned from its oceanic investigations some years ago. The *Belgica* ascertained that at some distance from the Greenland coast the depths rapidly decreased from 470 meters to 58 meters. It is to be hoped that the expedition of the Duke of Orleans will encourage the fitting out of a party to make a thorough survey of the still unknown coast between Terre de France and the Independence Bay of Peary.

The Germans of the Koldewey Expedition reached Cape Bismarck by a difficult sledge journey in 1870. At that point, in about 76° 40′ N., they were compelled to turn back on account of the failure of their supplies. It is not surprising that the Germans failed to recognize Cape Bismarck as part of an island, for in the account of the journey written by Payer he says that when they climbed to the top of Cape Bismarck a violent snowstorm prevailed, "which effectually prevented any great geographical acquisition."

IMMIGRATION OF THE ESKIMOS INTO GREENLAND.—Mr. H. P. Steensby summarizes in *Petermanns Mitteilungen* for August (pp. 186-187) the conclusions reached by Mr. Schultz-Lorentzen with regard to the immigration of the Eskimos into Greenland (Eskimoernes Indvandring i Grönland. *Meddelelser om Grönland,* No 26. Copenhagen, 1904). The stream of immigration from Bering Strait has been traced by the ruins of huts, graves, weapons, etc., from one island to another across the Arctic archipelago, north of our continent, to the narrow channels leading north from Smith Sound. This is undoubtedly the region where they crossed to Greenland. By what routes were they distributed along the east and west coasts?

Mr. Schultz-Lorentzen has deduced the theory, from what is now known of the natives and their abandoned dwelling-places, that the west coast Eskimos living south of Godthaab reached that region by way of the north and east coasts; and that the west coast natives living north of Godthaab, in Danish Greenland, reached their present habitat by sledging or boating south along the west coast.

As relates to their languages he points out that the Eskimos of Danish West Greenland may be divided into a northern and a southern group. The northern dialect, which is spoken north of Godthaab, makes predominant use of the vowels "u" and "o," and is designated as the "u" dialect. The southern dialect, spoken south of Godthaab, is called the "i" dialect, because the vowels "i" and "e" largely take the place of the vowels "u" and "o" in the northern dialect. It is found, also, that the east coast natives at Angmagsalik speak the "i" dialect.

These east coast natives and the west coast Eskimos south of Godthaab build partitions on their sleeping platforms, make the same shapes of boat frames, dress skins, and fashion their weapons and implements in the same manner, throw their dead into the sea, and in other ways resemble one another, while differing from the natives of Danish Greenland north of Godthaab. These are the most impor-

tant facts upon which he bases his theory as to the migration of the Eskimos after they reached Greenland.

This question can be settled only by the exploration of the still unknown northeast coast. Mr. L. M. Erichsen is said to be pushing his project for returning to the Smith Sound natives on the west coast and crossing the inland ice with a party of them for the purpose of exploring the unknown coast-line between Cape Bismarck and Independence Bay (BULLETIN, p. 554, Sept., 1905). If he succeeds in raising the necessary funds, he intends to make a thorough search of the coast of northeast Greenland for Eskimo remains. Should he find them, the migration of the natives around north Greenland to the east coast will doubtless be regarded as established.

THE SNOW HUTS OF THE ESKIMO.—The climatic control of the materials of which human dwellings are constructed has often been emphasized, and the general fact of snow huts in the Arctic, of light construction of leaves and bamboo in the moist tropics, or adobe houses in arid regions, and so on, are well known. The details of construction, however, and the more minute control of climatic conditions, have not, as yet, received adequate attention. For example, in the case of the snow huts of the Eskimo, it appears on the authority of Klutschak, as reported by Woeikof, that these huts, which are arched, are never constructed out of the first snow which falls. The Eskimo waits until successive snow-squalls and high winds have packed the snow down hard. In such cases as this, the density of the snow is not due to the weight of the snow, nor to successive thawings and freezings, as in the case of the formation of a névé, but it is simply the result of packing under wind action. R. DEC. W.

INTERNATIONAL POLAR ENTERPRISE.—The *Vingtième Siècle,* Brussels, says that at the suggestion of King Leopold the polar explorers Lecointe and Arctowski of the *Belgica* Expedition, Professor Nordenskiöld, and Messrs. Bruce and Shackleton met at the Mons Congress to consider a scheme for international polar expeditions to be submitted to the fifth section of the Congress. It is proposed that these expeditions be organized through the good offices of various Governments, and that an organized effort be made to raise large sums of money for them, and it was said that the Government of Belgium would be active in the organization of such expeditions. Letters were read from leading explorers, including Peary, von Drygalski, Charcot, de Gerlache, and Racovitza, who were unable to attend, but endorsed the project and offered their support. The section of the Congress on Polar Exploration later adopted the resolution in favour of the scheme. It is hoped, if the project is successful, not only to stimulate polar research but also to secure the earlier publication of the scientific results.

SCIENTIFIC WORK OF THE ZIEGLER POLAR EXPEDITION.—Mr. William J. Peters, who accompanied the Ziegler-Fiala Expedition to Franz Josef Land (BULLETIN, Oct., 1905) as scientific observer, has made a short statement of the scientific work. Meteorological observations, begun immediately after leaving Norway in July, 1903, were continued until July 28, 1905, and recorded by the methods of the U. S. Weather Bureau.

Magnetic observations (declination, horizontal intensity, and dip) were made from Oct. 1, 1903, to June 29, 1904, at Teplitz Bay, according to a programme arranged by Dr. L. A. Bauer. This embraced two-minute eye readings of declination for twenty-four hours on Wednesdays, and for periods of consecutive four

hours on every other day of the week. Horizontal intensity and dip were observed weekly.

Astronomic observations were made with a Repsold circle at Teplitz Bay and Alger Island. Tidal observations were made for eight months; and the exploration and charting of Franz Josef Land were carried on with very satisfactory results in the summers of 1904 and 1905.

PROPOSED EXPLORATIONS WEST OF THE PARRY ARCHIPELAGO.—The Parry Archipelago extends north of our continent between the islands of North Devon and Banks Land. Between the Parry Archipelago and the New Siberia Islands, off the coast of Siberia, there is a stretch of Arctic waters about 1,000 miles in length which has not been explored except along the track of the *Jeannette* drift. Mr. Einar Mikkelsen of Copenhagen has raised a part of the funds necessary to place a small expedition in this region. He hopes, with the help of a geologist and a naturalist, to discover if any islands exist in this long stretch of sea. It is doubtful if he will be able to start before 1907.

Meanwhile a young Englishman, Mr. Alfred H. Harrison, is now supposed to be on his way down the Mackenzie River, and he will try to solve the same problem. The London *Times* says he is an experienced traveller, and has trained himself very thoroughly to carry out the work he has in view on scientific lines. He is bearing the entire expense himself, but carries instruments lent to him by the Royal Geographical Society.

RESULTS OF THE CHARCOT EXPEDITION.—Dr. Jean Charcot has described before the Paris Geographical Society the results of his recent expedition to the Palmer Archipelago and Graham Land, south of South America. *La Géographie* prints a summary of the work done, from which it appears that the entire region around the winter station at Wandel Island was surveyed by triangulation; the outer coast-lines of the islands of the Palmer Archipelago were also surveyed and the work connected with that of the *Belgica* party, so that the coast survey in this region was completed. The Biscoe Islands and parts of the coast of Graham Land were likewise surveyed, and trigonometrical observations were made of various points on Alexander I. Land from a great distance, but sufficiently exact to give an idea of the outline of a part of this promontory. The tides were studied for six months, and the rise was found to be slight, the maximum being about five feet. Meteorological and magnetic observations were numerous, the biological and geological studies were well rewarded, and the collections were important.

THE NORTH POLE BY BALLOON.—Mr. Marcillac, an aeronaut of Paris, is preparing to attempt another invasion of the North Polar regions by balloon. He thinks an airship may be made for him which will be adapted for polar conditions, and that with his improved outfit he may hope to escape the fate that overtook Andrée.

TERRESTRIAL MAGNETISM.

THE MAGNETIC SURVEY OF THE NORTH PACIFIC OCEAN.—Dr. L. A. Bauer, Director of the Department of Terrestrial Magnetism in the Carnegie Institution, has informed the Society of the organization and preliminary work of the expedition which has begun the proposed magnetic survey of the North Pacific. The brig *Galilee* was chartered by the Department, and after having "swung" ship on Aug. 2, 3, and 4, in San Francisco Bay, to determine the effect from the remaining iron on board, she sailed on Aug. 5 for San Diego, reaching that port on Aug.

12. Magnetic data were daily secured under various conditions and with various instruments. Dr. Bauer accompanied the expedition, and *Science* reports that his deflection apparatus for determining horizontal intensity proved successful.

At San Diego the ship was again "swung" for the determination of the deviation co-efficients, some further alterations were made, and the *Galilee* left San Diego on Sept. 1 for Honolulu, arriving there on Sept. 15. She is now working in the region of the Pacific north of the Hawaiian Islands. In accordance with the plans, the *Galilee* is to return to San Francisco by Dec. 1, and will leave early in January for an entire circuit of the North Pacific Ocean if the necessary funds have been provided.

The *Galilee* is a wooden sailing vessel, built in 1891, and was originally in the passenger trade between San Francisco and Tahiti. Her length is 132.5 feet, breadth 33.5 feet, and depth 12.7 feet; net tonnage about 328. To adapt her for the purposes of the magnetic expedition, it was necessary to remove as much of the iron on her as possible, the principal change required being the substitution of the steel rigging by hemp rigging. The cabin space had to be enlarged for the accommodation of the scientific personnel, and a special observing bridge was built to run fore and aft, and to be about 15 feet above the deck, in order to get as far away as possible from the iron in the deck and in the sides of the vessel.

The *Galilee* is at present commanded by Captain J. F. Pratt, of the United States Coast and Geodetic Survey. He is assisted in the scientific work by Dr. J. Hobart Egbert, surgeon in the United States Coast and Geodetic Survey, by Mr. J. P. Ault, magnetic observer of the Institution, and by Mr. P. C. Whitney, magnetic observer and watch officer, also of the Coast and Geodetic Survey. The sailing master is Captain J. T. Hayes, and the crew consists of ten men.

The *Galilee* is the fastest sailer of her size in the Pacific Ocean. She has made a voyage of 3,000 miles from the South Pacific Islands to San Francisco in fifteen days, and has made as much as 308 miles in one day. By special courtesy of the Secretary of Commerce and Labor the *Galilee* has been classed as a yacht, in order to facilitate her passages from port to port.

GENERAL.

CAUSES OF OCEAN CURRENTS.—A paper by Dr. Nansen on this question appeared in the first three numbers of *Petermanns Mitteilungen* for 1905. His views are based upon his experiences during the voyage of the *Fram* and the investigations and laboratory experiments he has made since his return to Europe. He does not share the opinion, advanced by many writers, that ocean currents are caused by the predominating influence of atmospheric currents. As the effect of the earth's rotation brings about a deviation of the ocean currents from the direction of the wind, he believes that this fact vitiates the conclusions of those who hold to the above theory. Except on the equator and in special cases due to the proximity of large land-masses, he holds that it is impossible for a wind to produce a water current that coincides with it in direction.

It is his belief that the potent agent in the production of ocean currents is the difference in temperature between the equator and the poles. Winds, however, while not shaping the courses of currents, may influence to some extent their rate of motion. The main ocean currents, he believes, may be explained as due to influences introduced by the continents in their path. Dr. Nansen's paper is a searching and brilliant exposition of his investigations and deductions, but in so complicated a subject, bristling with disturbing factors, it may be long before a conclusion is reached that will be universally accepted.

THE LIBBEY CIRCLE IN SEISMOLOGY.—In the annual report for 1904 (Part I, p. 44) of the British Association for the Advancement of Science, Prof. Milne refers to the "Libbey Circle" and enters it upon an accompanying earthquake chart. Undoubtedly, Prof. Milne refers to the meeting of that Association in 1902 when Prof. William Libbey, of Princeton, was present and spoke at length upon what Prof. Guyot was in the habit of calling the great zone of fracture about the globe.

This circle is a small circle of the globe having Bering Strait as a centre or pole and a radius of about 80° of arc. It is found that a circle thus drawn cuts through all the depressed lands in the central portion of the globe.

Prof. Guyot often referred to this region as the zone of fracture and one that contained five-sixths of the active volcanoes of the world. It stands in clear contrast with the great circle of volcanoes surrounding the Pacific Basin. It is, in fact, a zone because a great circle will not exactly fit all these depressions, but a zone with slightly irregular borders and with this circle as an approximate median line will do so. Prof. Guyot never referred to this zone as in any way connected with seismological phenomena, but Prof. Libbey spoke of this part of the subject at considerable length, and reported that he had a large amount of as yet unpublished evidence of very great seismic activity within this zone.—(*Monthly Weather Review,* June, 1905.)

HELPS TO EXPLORERS.—Many explorers are familiar with the very valuable work edited by Dr. von Neumayer, "Anleitung zu wissenschaftlichen Beobachtungen auf Reisen." *Nature* says that at the age of four-score years he is issuing the fourth edition of this work, which is appearing in Parts (Jaennecke, Hanover). The work will comprise two volumes, the first dealing with geography and inanimate nature, the second with plants, animals, and man. More than thirty experts are collaborating under Dr. von Neumayer's editorship, so that each subject will be treated by an expert. The price of the two volumes will be 36 marks. The first two Parts contain articles on geographical observations, directions for somatological observations, and the beginning of an excellent article by Dr. von Luschan on field work in archæology. The last edition appeared in 1888, and in many branches of knowledge the advance since that date has been immense.

GEOLOGICAL BIBLIOGRAPHY FOR 1904.—The Geological Survey has issued, as *Bulletin* 271, the "Bibliography and Index of North American Geology, Paleontology, Petrology, and Mineralogy for 1904," compiled by Mr. Fred. B. Weeks. An effort was made to procure for this annual publications which were not noticed in the bibliographies of previous years. The volume contains full titles of papers arranged alphabetically by authors' names, with a brief description of the contents; the index makes full reference to the subjects treated in the papers.

THE TENTH INTERNATIONAL GEOLOGICAL CONGRESS.—This Congress is to meet in the City of Mexico on Sept. 6, next year. Mr. José G. Aguilera, the Director of the Geological Institute of Mexico, has been appointed Chairman of the Committee of Arrangements.

AN INTERNATIONAL COMMITTEE.—The Committee provided for by the Eighth International Geographic Congress to take steps to bring about closer social relations among the geographical societies of the world has been organized as follows: Prof. William Libbey of Princeton University, president; Prof. H. Cordier of the Ecole des langues orientales, Paris; Dr. Hugh Robert Mill, London; Prof. A. Penck of the University of Vienna; Dr. A. de Claparède of the University of

Geneva; Prof. E. von Drygalski of the University of Berlin; Felipe Valle, director of the Observatory at Tacubaya, Mexico; and Eki Hioki, first secretary of the Japanese Legation at Washington.

PERSONAL.

Dr. Robert Sieger, who in 1898 became Professor at the Export Academy in Vienna, and since 1903 has been in charge of the Department of Commercial Geography in the University of Vienna, has been appointed Professor of Geography at the University of Gratz, to succeed the late Dr. E. Richter. Dr. Sieger's writings on physical geography and many other geographical topics made him well known before he turned his attention largely to economic and commercial geography, in which he is an acknowledged expert.

Mr. Charles W. Brown has been appointed Instructor in Geology and Minéralogy at Brown University.

Dr. W J McGee, formerly ethnologist in charge of the Bureau of American Ethnology, has been appointed Managing Director of the St. Louis Public Museum.

Dr. H. Foster Bain, Ph.D., Geologist of the U. S. Geological Survey, has been appointed State Geologist of Illinois.

Mr. Bailey Willis, of the U. S. Geological Survey, will in January next give a course of twelve lectures in the Geological Department of the University of Wisconsin on the subject of "Continental Variations, with Special Reference to North America."

The University of Cambridge has conferred the degree of Doctor in Science upon Capt. Robert F. Scott, the Antarctic explorer, and Sir Francis Younghusband, who led the recent British mission to Lhasa.

Prof. A. P. Brigham, of Colgate University, spent the summer with his family in Great Britain. He also made the cruise of the Norwegian fiords from Odde and Bergen to Trondhjem, where glacial erosion, the industries, and the Lake Soen landslip of last January were among the things that interested him. Besides revisiting Oxford and London, he spent some time in Norfolk and along the east coast, the country of the Broads and the shore cliffs, with evidences of encroachment by the sea made classic by Lyell in his "Principles." He also visited the Peak district of Derbyshire and the Snowdon region of North Wales, collecting many photographs and comparing different types of scenery and of British rural life.

THE AMERICAN GEOGRAPHICAL SOCIETY.

Announcement.—At the next meeting of the Society, to be held at Mendelssohn Hall, No. 119 West Fortieth Street, on Tuesday, November 28, 1905, at 8.30 o'clock, P. M., Mr. Bailey Willis will narrate his Experiences among the Chinese.

NEW MAPS.

AFRICA.

Africa.—Deutsche Arbeit in Afrika 1884 bis 1905. Scale, 1:25,000,000, or 394.5 statute miles to an inch. By Paul Langhans. *Deutsche Erde,* No. 4, 1905. Justus Perthes, Gotha.

Shows in colours the areas of the German Protectorates in 1884 and 1885, and

their increased area to 1905; regions explored by German travellers; coasts served by German steamship lines in 1884 and the extension of this service to 1905; German planting and trade enterprises before 1884 and their growth to 1905. The map is based upon the new general map of Africa in Stieler's Hand Atlas. It is full of information clearly presented, and gives a good idea of the part Germany has taken in many phases of African development during the past thirty years.

East Africa.—Eisenbahnkarte von Ostafrika 1905. Scale, 1:12,000,000, or 189.3 statute miles to an inch. Beihefte zum *Tropenpflanzer,* Sept., 1905.

A map in colours showing the completed railroads in East Africa and those now building or projected from the Uganda R.R. in the north to the Beira-Bulawayo R.R. in the south.

East Africa.—Der Hafen von Kilwa-Kisiwani. No scale. Beihefte zum *Tropenpflanzer,* Sept., 1905.

A black-and-white sketch map showing soundings in the harbour.

East Africa.—Wirtschafts- und Verkehrskarte des südlichen Teiles von Deutsch Ostafrika. Scale, 1:3,000,000, or 47.34 statute miles to an inch. Beihefte zum *Tropenpflanzer,* Sept., 1905.

An excellent commercial map showing our present knowledge of the distribution of cattle, vegetable products, rubber, coal and iron, and also the caravan and steamer routes, telegraph lines, and the projected railroad between the coast and the great lakes.

Sahara.—Tracé de la Ligne Télégraphique de Touggourt à Nefta par El Oued. By P. Bayol, Engineer of Telegraphs. Scale, 1:400,000, or 6.3 statute miles to an inch. *La Géographie,* Vol. 12, No. 1. Paris, 1905.

Illustrates the physical conditions along the railroad line from Nefta to Tuggurt, showing dunes, sand plateaux, oases, wells, etc. Surveys are now in progress for the extension of this telegraph line across the Sahara to Timbuktu.

AMERICA.

Canada.—New Brunswick. (St. John sheet.) Scale, 1:500,000, or 7.89 statute miles to an inch. Department of Interior. Ottawa, 1905.

This is sheet 13 of the Standard Topographical Atlas of Canada now being produced under the supervision of Mr. James White, Geographer of the Department of the Interior.

Canada.—Map of Manitoba, Saskatchewan, and Alberta. Scale, 1:792,000, or 12.5 statute miles to an inch. Department of the Interior, Ottawa. Corrected to May 1, 1905.

This map shows the even-numbered sections of land that have finally been disposed of by the Government.

Canada.—Electoral Divisions in the Provinces of Saskatchewan and Alberta. Department of the Interior, Ottawa, 1905.

The boundaries of the divisions are shown in red.

Canada.—Electoral Divisions in Southern Alberta. Department of the Interior, Ottawa, 1905.

Shows the divisions as far north as the southern boundary of the former territory of Athabaska.

Canada.—Electoral Divisions in Southern Saskatchewan. Department of the Interior, Ottawa, 1905.

Shows the divisions on a larger scale as far north as the land surveys have been extended (above 53°). These three maps are an outcome of the admission of the two new provinces into the Dominion.

Chile.—Canal Smyth and Bahia Muñoz Gamero. Scale, 1:20,000, or 0.3 statute mile to an inch.

Puertos del Seno Otway. Puerto Pomar, scale 1:10,000, or 0.1 statute mile to an inch; Puerto Toro, scale 1:10,000; Puerto Valderrama, scale 1:5,000, or 0.07 statute mile to an inch.

Canal Fitz Roy. Scale, 1:40,000, or 0.6 statute mile to an inch.

Canal Señoret I Estero Eberhardt. Scale, 1:30,000, or 0.47 statute mile to an inch.

Magallanes. Puertos en el Golfo Xaultegua. Estuario Guzman. Puerto Bobillier. Scale, 1:20,000, or 0.3 statute mile to an inch.

All published by the Hydrographic Office, Valparaiso.

These are charts of waterways and natural harbours in the Chilean portion of the Straits of Magellan, made from surveys carried out by the Hydrographic Survey of Chile between 1900 and 1903. Many soundings are given, also the topography of the adjoining shores. They are a contribution to the mapping of Magellan Strait as these parts of it have not been known in detail.

United States.—Reduced Survey Map of the United States and Part of Canada. Scale, 1:5,000,000, or 78.9 statute miles to an inch. By J. G. Bartholomew. Edinburgh Geographical Institute, 1905. (Price 2s.)

This small-scale map shows mountain ranges only by hairlines. The result is that topographic delineation does not blur place-names or other information. Everything may easily be read, and all the principal railroads, with many of their branch lines, are admirably laid down. Rivers, nomenclature, and land transport routes are in black. All other colours are confined to the boundary lines of the States and the lakes and ocean, which enhances legibility. On maps of this scale, New Hampshire, for example, is apt to be a more or less indistinguishable blur of mountains and place-names. On this map every detail shown of that State may be easily read. The map is folded for the pocket, and may be especially commended to tourists. Eight insets show the most important cities in the United States on a comparatively large scale.

United States Geological Survey.

United States.—Geologic Atlas of the United States, No. 122, Tahlequah Folio, Indian Territory-Arkansas. Washington, D. C., 1905.

This contains the fourth geological series of sheets of the Indian Territory yet published.

U. S. Hydrographic Office Charts.

Pilot Chart of the North Pacific Ocean. Nov., 1905.

Prints in addition to sailing routes, etc., charts published, cancelled, and corrected from Sept. 1 to Sept. 30, 1905, average weather conditions over the Northern Pacific in November, and (on the reverse) the Storm Signal Code of the Imperial Maritime Customs (Shanghai, China) to come into force on Jan. 1, 1906.

Pilot Chart of the North Atlantic Ocean. Oct., 1905.

ASIA.

Russian Turkestan.—Afghanistan.—Asie. Scale, 1:1,000,000, or 15.78 statute miles to an inch. Sheets, Asterabad, Merv, Boukhara, Hérat, and Maïméné. Service Géographique de l'Armée, Paris. (Price, 25 cents.)

These sheets, issued in 1901 and 1902, show progress in the execution of a map of the world on the uniform scale of 1:1,000,000, as recommended by the last three International Geographical Congresses on the initiative of Dr. Penck of Vienna. France was the first country to fall into line with the suggestion, and the French Geographical Service of the Army is now producing this map of Asia on the uniform scale mentioned, the sheets being limited by parallels and meridians. They thus appear, by execution and arrangement, as parts of a general map of the world. The sheets are clearly printed in colours—roads in red, water blue, and railroads and lettering in black, with the relief shown by hill shading and depths of water by contour lines and figures in meters. The present sheets include the southern part of Russian Turkestan from the Caspian Sea to the east of Samarkand and the northwestern part of Afghanistan.

China.—Sketch Map of the River Pei Ho. Scale, 3.06 statute miles to an inch. Imperial Maritime Customs, Statistical Series, Nos. 3 and 4. Shanghai, 1905.

Shows the relations of Tientsin to the mouth of the river, with the railroad and river connections and the cuttings along the Pei Ho which have reduced the length of the river journey to Tientsin about one-fourth.

China.—Plan of the Port of Shasi. Scale, 1 inch to 200 feet. (This map and the three maps following are contained in the volume mentioned above.)

The scale permits a minute plan of the port, but the delineation of the sandbank in the Yangtse is of only temporary value, as the bank is continually shifting.

China.—Changsha Harbour. Scale, 950 feet to the inch. Surveyed in December, 1904, by D. MacLennan, Harbour Master.

Changsha, the capital of Hunan, was added to the list of China's open ports under the new commercial treaty with Japan. Soundings are given in feet, in the Heng River, on which the city fronts. The Heng is a southern tributary of the Yangtse, and vessels may make the trip to Hankow and return in three days.

China.—Sketch map of the Province of Hunan. Scale, 25 statute miles to an inch.

The drainage is in blue, and mountain features are shown with considerable effect. The map is especially valuable as showing the trade routes in this very active province.

China.—Wuhu City and Surroundings. No scale. 1904.

A map in colours giving a good plan of the city, including the new foreign settlement, in which the positions of the Consulates, Missions, etc., are indicated. There are no wharves, but the position of the hulks, which serve the various shipping lines for the transfer of freight, is shown. This city is one of the new treaty ports on the Yangtse, but the map, though printed in four colours, has neither scale nor geographic co-ordinates.

Eastern China.—A Khinai Nagy Alföld Szerkezetének Térképe. Scale, 1:3,333,333, or 52.6 statute miles to an inch. *Bull.* of the Hungarian Geographical Society, Vol. 33, No. 6. Budapest, 1905.

One of the excellent maps that Hungary is producing. Coloured to show the geological formations and contours of ocean depths. The Yangtse and Hoang River deltas are sharply differentiated from the neighbouring regions; completed railroads are made conspicuous, except that the German line should have been extended to Tsinan. The map is limited on the west by the 110th meridian and on the south by the 30th parallel.

Karte von Kleinasien.—In 24 sheets. Scale, 1:400,000, or 6.3 statute miles to an inch. By Dr. Richard Kiepert. Sheets, Adalia and Smyrna. Dietrich Reimer (Ernst Vohsen), Berlin, 1902.

Corea.—Carte des Télégraphes Impériaux de Corée. Scale, 1:4,500,000, or 71 statute miles to an inch. By J. de Moidrey. *La Géographie,* Vol. 12, No. 1, Paris, 1905.

The telegraph lines centring in the capital, Seul, reach Fusan and Masampo, on the south coast, Mokpo, Kunsan, Chemulpo, Chinnampo and Echow on the west coast, and Wunsan, Hamheung, Pukchong, Sungchin, and Kiongsung on the east coast, besides various important points in the interior.

Tibet.—Map showing Explorations by Major C. H. D. Ryder, and Capts. H. Wood and H. M. Cowie of the Tibet Frontier Commission, 1904. Scale, 1:2,500,000, or 39.45 statute miles to an inch. *Geog. Jour.,* London, Oct., 1905.

This map, reduced from the sheets of the Survey of India, shows the route north of the main Himalayas between Lhasa and India. The area surveyed on this journey with the plane table was about 40,000 square miles. The triangulation, which is still under compilation, was invaluable in correcting the plane table work and in fixing many heights. While the detailed surveys are not yet ready for publication, the map will be useful for the time being in correcting atlas sheets as far as relates to the course of the Upper Tsangpo or Brahmaputra and the hydrography of the basin of Lake Mansarowar, about which there has been much dispute. The map shows that the Brahmaputra has its birth in the confluence of a number of streams coming from the water-parting between the Brahmaputra and the Lake Mansarowar systems. This lake, on the other hand, is not the source of the Sutlej, affluent of the Indus, as had been supposed; the lake region has at present no outlet, though a former channel leading to the Sutlej River was discovered. An inset shows the triangulation carried out between Lhasa and Mount Everest.

Tibet.—Plan of Lhasa. From a Survey by Major C. H. D. Ryder and Capt. H. M. Cowie, 1904. Scale, 1:30,000, or 2.11 inches to a statute mile. *Geog. Jour.,* London, Oct., 1905.

A black-and-white map showing the plan of the town and the nature of its environment. All the prominent buildings and other important points of interest are indicated.

Dutch East Indies.—Schetskaart van het Eiland Bali. Scale, 1:250,000, or 3.95 statute miles to an inch. Topographic Bureau, Batavia, 1905.

One of the fine maps of the Dutch East Indies which the Topographic Bureau is now producing. It shows all leading topographic features, the hills in brown, rivers blue, coastal plains and valleys white. The map is rich in place-names and cultural features. All the anchorages, reefs, and sandbanks along the coast, the roads and paths, the provincial boundaries, and many other details are given, including the native temples and towers.

AUSTRALASIA.

Australia.—Tasmania. Scale, 15 statute miles to an inch. Government Printing Department, Hobart, 1900.

Coloured to show the counties with railroads and common roads. Hill features are roughly indicated by hachuring. Two insets show the relations of the island to the State of Victoria.

Australia.—Map of Western Australia. Scale, 1:502,400, or 90 statute miles to an inch. Department of Lands and Surveys, Perth, 1901.

A black-and-white map showing the boundaries between the land districts, gold fields, and much other detail.

Australia.—Map of Western Australia. Scale, 1:5,702,400, or 90 statute miles to an inch. Department of Lands and Surveys, Perth, 1903.

An excellent small-scale map that will interest all who are watching the development of this State. Colour is used with tasteful and excellent effect to show the land areas leased for pasturage, agricultural lands open for settlement, gold fields, rainfall belts, railroads, lighthouses, etc. An inset map in six colours shows the distribution of the timber areas.

Australia.—Map of Western Australia. Scale, 1:3,168,000, or 50 statute miles to an inch. Department of Lands and Surveys, Perth, 1903.

A map in colours containing practically the same information as that of the map just mentioned, but showing more hill features.

Australia.—The following maps of Western Australia, from the Department of Lands and Surveys, Perth, relate chiefly to the Topographical and Geological Surveys carried out in the study of the mineral resources of the State:

Geological Map of Northampton. (2 sheets.) Scale, 20 chains to an inch. 1898.

Geological Map to accompany Report on the Geology of the Kimberley District. (2 sheets.) Scale, 6.5 miles to an inch. Western sheet, 1883; Eastern sheet, 1884.

Plan of Proclaimed Boundaries of the Coolgardie Gold Field. Scale, 10 miles to an inch.

Geological Map of Coolgardie. (4 sheets.) Scale, 10 chains to one inch. By Blatchford and Allhusen. 1898.

Showing geological formations, gold workings, dip of strata, heights above sea-level, depths below surface, boundaries of leases, wells, bores, etc.

Plan of Proclaimed Boundaries of East Coolgardie Gold Field. (2 sheets.)

Mining Map of the Boulder Belt, East Coolgardie Gold Field. (2 sheets.) Scale, 4 chains to an inch. 1900.

Geological Map of the Boulder Belt, East Coolgardie Gold Field. (2 sheets.) Scale, 4 chains to an inch. By Maitland and Campbell. 1903.

Vertical sections to accompany geological map of the Boulder Belt, East Coolgardie Gold Field. By Maitland and Campbell. 1903.

Topographical Map of Menzies, North Coolgardie Gold Field. Scale, 20 chains to an inch. By W. D. Campbell. 1899.

Geological Sketch Map of the Country between Cue, Peak Hill, and Menzies from the Latest Official Information. Scale, 33 miles to an inch.

The geological boundaries are approximate only.

Geological Map of the North Lead, Kanowna. By T. Blatchford. Scale, 8 chains to an inch.

Topographical Map of Kalgoorlie. (4 sheets.) Scale, 10 chains to an inch. Based on tacheometric surveys by Campbell and Becher. Geological Survey of Western Australia. Perth, 1900.

Geological Map of Kalgoorlie. (4 sheets.) Scale, 10 chains to an inch. By A. Gibb Maitland, Government Geologist, and W. D. Campbell. Geological Survey of Western Australia, Perth, 1902.

Topography from tacheometric surveys. Coloured for geology, and the boundaries of mining properties shown.

The Collie Coal Field. Scale, 40 chains to an inch. By A. Gibb Maitland, Government Geologist, 1898.

EUROPE.

Europe.—Carte géologique internationale de l'Europe. (49 sheets.) Scale, 1:1,500,000, or 23.67 statute miles to an inch. Part 5, containing sheets A VII, B VII, C VII, D VII, F IV. Dietrich Reimer, Berlin, 1905.

Thirty sheets of this map have thus far appeared, together with the scheme of colours. It would be more convenient for students if the colour scheme for each sheet were printed on the margin, as is done on the maps of the U. S. Geological Survey. These sheets are large, and cannot very conveniently be handled with another large sheet containing a full exposition of the colour scheme, much of which is not applicable to the particular sheet under examination.

Germany.—Ergebnisse der Pflanzengeographischen Durchforschung von Württemberg, Baden und Hohenzollern. Karte 1, Verbreitung von Saxifraga aizoon und Silene rupestris; Karte 2, Verbreitung der alpinen Gruppe. Scale, 1:1,000,000, or 15.7 statute miles to an inch. Beilage zu Jahreshefte des Verein für Vaterländische Naturkunde in Württemberg, Stuttgart, 1905.

These maps contain the results of work done by the Union for German Natural History, organized in Würtemberg in 1899 to study botanical distribution and obtain data for the production of botanical maps. A large number of volunteer observers participate in the work. The distribution of the varieties of plants, mentioned in the titles, are shown on the map sheets by large blue dots.

Germany.—Regenverteilung am 17 Juni, 1904, im Maas, Rhein- u. Wesergebiet. By Dr. P. Polis. Scale, 1:1,250,000, or 19.7 statute miles to an inch. *Peterm. Mitt.,* Vol. 51, No. 9. Justus Perthes, Gotha, 1905.

Dr. Polis is director of the Meteorological Observatory at Aachen. His map, in nine tints of blue, illustrates his article on the cloud-bursts that deluged parts of these river basins.

Montenegro.—Tiefenkarten Montenegrinischer Seen. Gornje Blato, scale 1:25,000, or 0.39 inch to a statute mile; Das Oko am Blato, scale 1:8,000; Rikavacsee, scale 1:4,000, or 333.3 feet to an inch; Bugomirsko Jezero, scale 1:25,000, or 281 feet to an inch.) By Dr. Kurt Hassert, *Peter. Mitt.,* Vol. 51, No. 9, Justus Perthes, Gotha, 1905.

Illustrating an article by Dr. Hassert on topographic surveys in Montenegro. Heights and depths are given in meters.

Switzerland.—Sheets Ober Engadin, Jungfraumassiv-Oberwallis, and Evolena-Zermatt-Monte Rosa. Scale, 1:50,000, or 0.7 statute mile to an inch. Contour interval, 30 meters. Swiss Topographical Bureau, Bern, 1904.

These three sheets are fine examples of the new map of Switzerland that the Swiss Topographical Bureau is producing on this scale. The scale is large enough to give a clear idea of the lateral and medial moraines of the glaciers. After the style long ago introduced into Swiss cartography, the highest ridges and peaks rise in black masses above the contoured areas, while, at the same time, the cartographer gives a generalized idea of the forms into which they had been sculptured. Ice is sharply distinguished from the land surface by the blue contours of the glaciers, contrasting with the brown contours of the land. With all the great variety of topographic forms and other information shown on these sheets, practically every name in large or small type may be read with perfect ease.

SWITZERLAND.—Sheets, Zürich and Luzern. Scale, 1:25,000, or 0.39 statute mile to an inch. Swiss Topographic Bureau, Bern, 1904.

These beautiful sheets show how adequately all the results obtained by the Survey Department are expressed on this scale.

SWITZERLAND.—Carte Topographique du Canton de Genève. Scale, 1:25,000, or 0.39 statute miles to an inch. Swiss Topographic Bureau, Bern, 1900.

This is a reduction on stone of the 12-sheet map of the canton in the Federal Topographical Atlas. All forest areas are shown.

ATLASES.

STIELER'S HAND-ATLAS.—Neue neunte Lieferungs-Ausgabe. 100 Karten in Kupferstich. Lieferungen 49-50. Justus Perthes, Gotha, 1905. (Price, 60 pf. for each part containing 2 map sheets.)

With these four sheets the Ninth Edition of this most famous of all atlases is completed. The last sheets appear four years after the publication of the first sheets of this edition. The house of Justus Perthes, Gotha, is to be congratulated upon finishing this work, which marks another step forward in the making of atlases combining scientific accuracy with great mechanical excellence. The alphabetical index, which accompanies the last sheets, is a folio of 237 pages, containing about 240,000 names and 36 more pages than the index to the Eighth edition, though it is sold at a smaller price.

No. 71 is Sheet 3 (Guinea) of the 7-sheet map of Africa on a scale of 1:7,500,000, or 118.3 statute miles to an inch. It shows the countries bordering on the Gulf of Guinea, and has insets of the Lower Congo and the coast lands of Upper Guinea on the scale of 1:3,700,000, or 58.3 statute miles to an inch, and of Western Cameroons on a scale of 1:1,500,000, or 23.67 statute miles to an inch. No. 72 is Sheet 4 (Kongo) of the map of Africa, and shows Equatorial Africa between 12° N. and 10° S. It contains a large amount of new information which the surveys of the past few years have made available. Nos. 95 and 97 are Sheets 1 and 3 of the 6-sheet map of South America, by H. Habenicht and H. Salzmann, on a scale of 1:7,500,000.

GEOGRAFIA DE LA PROVINCIA DE CORDOBA.—By Manuel E. Rio and Luis Achaval, Civil Engineers. Official Publication. Compañia Sud-Americana de Billetes de Banco. Buenos Aires. 1905.

This Atlas accompanies the large work in two volumes "Geografia de La Provincia de Córdoba" by the same authors, one of the most excellent and exhaustive works yet written on any part of South America. It includes 17 large plates of maps, diagrams, profiles, and photographs. The lithographic production of the

maps is somewhat glaring in its use of colors, but this does not detract from the excellent results of the painstaking care with which a large amount of data has been reduced to cartographic form. The sheets include a political map of the province, a hypsometrical map in four colours and white, hydrographic maps, a geological map in seven tints, sheets showing the distribution of the cultivated area of maize, alfalfa, flax, etc., and a sheet showing railroads, telegraphs, etc. There are also small maps and diagrams illustrating climate and density of population, profiles of river valleys and many half-tone pictures of the city of Cordova and views in various town and country districts. Most of the map scales are 1:1,000,000 and 1:250,000. The Atlas reflects much credit upon the compilers and upon the enterprising province of Argentina, which bore the cost of its production.

THE SOUTH POLAR CHART.

This number of the BULLETIN contains a map of the Antarctic regions showing all the larger results of exploration there to the present time. The completion of the map was delayed about two months in the hope, which was fortunately realized, that the cartographic results of Charcot's Expedition to the western coast of West Antarctica might be received in time to be utilized. By waiting for his map, which appeared in the June number of *La Géographie,* it was possible to include in our chart a generalization of the cartographic surveys of all the expeditions of recent years.

With the return of the Charcot Expedition, all research in the South Polar regions is suspended for the present. Considerable time may elapse before it will be possible to add new facts to the information given in this chart.

The additions made by Charcot to the mapping of the west coast of West Antarctica practically complete the survey of that region as far south as Bismarck Bay. He carried on the survey work where the *Belgica* Expedition and Nordenskjöld left it, and mapped the hitherto uncharted outer coast-line of the islands in the archipelago west of Danco Land and Palmer Land (see chart, lower right-hand corner), so that it is possible to show on our map the extent and shape of these islands.

The map was drawn for the BULLETIN by Dr. Hans Fischer, whose advanced geographical scholarship and cartographic skill are well known to geographers. The scale is 1:40,000,000, or 631 statute miles to an inch. The map takes in enough of the southern coasts of America, Africa, and Australia to show the geographical relations of the Antarctic lands to the continental masses north of them.

The northern limits of floating bergs and pack-ice are indicated, and seven tints of blue are used for various ocean depths from shallow waters to over 4,000 fathoms. The lands are shown in brown, and the inland ice and glaciers are marked. The heights of all the more prominent mountains are given in feet, and a large number of ocean soundings in fathoms. The still unexplored area is left white.

In the corners of the sheet are four insets delineating on much larger scales, and therefore in greater detail, parts of the Antarctic Continent, or land-masses the exploration of which was most advanced by the recent expeditions or which are entirely new discoveries. These insets are:

South Victoria Land, on a scale of 1:20,000,000, or 315.6 statute miles to an inch, showing the British surveys of the east coast, together with Scott's route to his farthest south, and also his sledge route westward over the inland ice;

The Region of Mounts Erebus and Terror, on a scale of 1:4,000,000, or 63.1 statute miles to an inch, showing the greatly-changed geographical aspect of this region as revealed by the surveys of the *Discovery* Expedition. The various features of Erebus Island are strongly shown. Scott discovered that the volcanoes Erebus and Terror, made famous by Ross, are on this island instead of on the mainland;

Kaiser Wilhelm II. Land, on a scale of 1:8,000,000, or 126.2 statute miles to an inch, showing the winter station of the *Gauss* about 50 miles from the coast of the newly-discovered land. This fact is given as one of the reasons why the *Gauss* Expedition did not sledge inland on this part of the coast of Antarctica;

West Antarctica, on a scale of 1:10,000,000, or 157.8 statute miles to an inch. Reference to this inset has already been made.

Such a chart as this is an epitome of the history and progress of discovery in the south polar regions. The detailed routes of the earlier explorers were not inserted, as it was thought that these numerous lines would interfere with the clear expression of more important information; but various points these explorers reached and the discoveries they made are given, with dates, so that the contribution of each to the revealing of this region is clearly shown. The routes, however, of the recent British, German, Scottish and Swedish expeditions are given in detail.

Before the recent revival of south polar exploratory enterprise (1898-1904) the best cartographic summing-up of the geographical discoveries made in that part of the world was to be found in Dr. K. Fricker's South Polar Chart in his book "The Antarctic Regions"

(English edition, the Macmillan Company, New York, 1900). His chart was based upon that of V. von Haardt, with corrections made by Dr. Fricker. Any student who may compare our map with that of Dr. Fricker will see that the recent expeditions have made important additions to knowledge, not only of Antarctic lands but also of south polar waters. Our map, for example, shows among the various oceanic discoveries in this southern ocean the submarine ridge found by the *Scotia* on her journey home last year. This ridge, which is coincident with the meridian of 10° W., completely alters previous conceptions of the form of this part of the ocean bed; it is a continuation of the South Atlantic ridge, which is thus found to extend 1,000 miles farther south than it was previously known to exist.

OBITUARIES.

ELIAL F. HALL.

BORN JULY 26, 1827.
DIED OCTOBER 12, 1905.

Mr. Hall was born at Carroll (now Kiantone), Chautauqua County, N. Y., of New England parents, and passed his early years in that place. He was graduated at Yale College in 1849, and then went to Europe, where he studied and travelled for three years, principally in Germany and France. He was admitted to the bar in New York in 1855, but devoted himself for some time to journalism before entering actively upon the practice of his profession.

He had become interested in the subject of civil service reform in Great Britain, and was one of the thirty-two citizens who, in 1877, organized the New York Civil Service Reform Association. Devoted as he was to the cause of good government, Mr. Hall never held office nor sought political preferment.

In 1868 he was elected to fellowship in the American Geographical Society. He became a member of the Council in 1872, and Recording Secretary in 1876. These positions he held until 1894, when failing health compelled him to leave New York for a milder climate during the winter months, which he spent sometimes in Alabama, sometimes in Florida. He made a visit every summer to his friends in this city and in Jamestown, N. Y., where members of his family resided. He was making his preparations to return to

Florida this year, when he succumbed to an attack of pneumonia in New York.

Mr. Hall's interest in geography was a part of his life. He studied systematically the records of the great discoveries in the past, and he followed with close attention the progress of exploration in Africa and Asia and in the Arctic. He wrote on these subjects for the daily press and in the BULLETIN with fulness of knowledge and critical good sense. His longest contribution, and almost the only one to which his name is attached, is the paper on Gerard Mercator, printed in 1878.

In private, as in public, Mr. Hall was a man wholly without pretension, firm in his convictions and in his sense of duty, outspoken and loyal and fair-minded.

BARON VON RICHTHOFEN.

A telegram from Berlin has announced the death of Baron Ferdinand von Richthofen at his residence in that city on the 7th of October.

This distinguished geographer and geologist was born at Karlsruhe, in Silesia, in 1833. He studied at Breslau and in Berlin, and accompanied Count von Eulenburg on the Prussian Expedition to Eastern Asia in 1859. For the next twelve years von Richthofen travelled and studied in China and Indo-China, the Indian Archipelago, and Japan.

He returned to Germany in 1872, and has since been identified with the Gesellschaft für Erdkunde in Berlin, as Member of the Council, Vice-President, and President. He filled the Chair of Geography, successively, in the Universities of Bonn, of Leipzig, and of Berlin, and in 1902 he became Director of the Institut für Meereskunde.

In 1903 he was made Rector of the University of Berlin.

Baron von Richthofen is an acknowledged authority in geography and geology. Among his publications are The Comstock Lode; his Letters on the Chinese Provinces, addressed to the Shanghai Chamber of Commerce; his Guide for Explorers; and his magnificent work on China.

WILLIAM THOMAS BLANFORD.

This geographer, geologist, and naturalist died in England on June 23. For nearly a half century his name was intimately connected with scientific progress in India. His brother Henry, eminent in the same lines of work, died in 1893. William Blanford became

connected with the Geological Survey of India in 1855, and was the first to comprehend and to explain the geological structure of the peninsula. On two occasions he was detached from the Survey: when he went as geologist with the Abyssinian Expedition in 1867, and with the Boundary Commission to Persia in 1872. His scientific interests also extended to natural history. He assiduously collected in its various branches, and his mind was a storehouse of facts relating to the distribution and habits of the Indian fauna. His most important work was "The Manual of the Geology of India," the larger part of which was written by him. This work has been kept up to date, and is the standard authority. After his retirement from the geological field, he edited the comprehensive account of the fauna of British India, published by the Indian Government, and contributed to it the volume on mammalia and two volumes on birds.

CAPTAIN JOSEPH WIGGINS.

This adventurous navigator died on September 13th, in England, aged seventy-four years. He rediscovered, about thirty years ago, an old ocean highway within the Arctic Circle. The problem he set himself to solve was that of navigating the Kara Sea, between Novaya Zemlia and the mainland of Siberia during the two or three summer months when it is comparatively free from ice. This route was navigated over 200 years ago, but had been lost until Captain Wiggins once more found it in 1874. In 1878 he took a steamer through the Kara Sea up the Yenisei River, and discharged her cargo at various points along the river for 1,000 miles from its mouth. These expeditions were successfully repeated in the following years. No fewer than twenty-four expeditions with thirty-seven vessels passed safely through the Kara Sea without the loss of a single ship, until the unfortunate wreck of the steamer *Stjernem,* which Captain Wiggins maintained was an accident that might have happened anywhere. This freightage business proved remunerative; but the Kara Sea route, in recent years, has been neglected in favour of the Siberian railroad and other improved facilities for land transportation. Public interest in the route was revived some months ago by the decision of the Russian Government to convey rails and railroad material through the Kara Sea and up the Yenisei.

HERMANN VON WISSMANN.

This distinguished African explorer died on June 16th at his home near Liezen, in Styria, from the results of an accident while

hunting. Born at Frankfort on the Oder, he chose a military career. While stationed at Rostock he became acquainted with Dr. Paul Pogge, and accepted an invitation to accompany him into inner Africa, whither the German African Association was about to send him for exploration. In 1881-82 they crossed Central Africa from the Portuguese port of Loanda to Nyangwe, on the Congo, making one of the most thorough and scientific explorations that had been carried out up to that time. Their accurate route map, crowded with information, was a model for later explorers. Dr. Pogge then returned to the west coast; but von Wissmann went on to the east, reaching the Indian Ocean at Saadani in November, 1882—the first German to cross tropical Africa. He described this journey in his book, Unter deutscher Flagge quer durch Afrika, published at Berlin in 1888.

This brilliant journey led to his employment by King Leopold to explore the Kasai, the largest southern tributary of the Congo. He followed it from its headwaters to its confluence with the Congo, proving that it joined that river far west of the point marked on the maps.

After a few months of rest, he made his second crossing of the continent, reaching the Indian Ocean at the mouth of the Zambezi. The Kasai work was described by von Wissman and his companions —Wolf, François, and Müller—in "Im Innern Afrikas: die Erforschung des Kassai," published in 1888. Von Wissmann also wrote "Meine zweite Durchquerung Aequatorial-Afrikas, 1886-87," of which an English translation appeared in 1891 under the title of "My Second Journey through Equatorial Africa."

In 1889 Prince Bismarck appointed him Imperial Commissioner, with instructions to quell an Arab insurrection in German East Africa—a difficult undertaking, in which he was completely successful. Later he served in the colony under Baron Soden, its Governor. He was the first to launch a Government steamer on Lake Nyassa. He cleared the country between Nyassa and Tanganyika of slavehunters, and went home in December, 1893, with health much impaired. He was appointed Governor of German East Africa in 1895, but was compelled, a little over a year later, to retire from office owing to the state of his health. He will be remembered as an explorer of large achievement and an official of great executive capacity, whose constant effort was to develop the resources of the colony, to promote scientific research, and to improve the condition of the natives.

BOOK NOTICES.

Historia de las Guerras Civiles del Perú (1544-1548) y de otros Sucesos de las Indias, por Pedro Gutiérrez de Santa Clara. Tomo III. (Colección de Libros y Documentos Referentes á la Historia de América, Tomo IV. Madrid, Victoriano Suárez, 1905.

This third volume (Book III) of the work of Pedro Gutierrez de Santa Clara differs from the preceding two (*see* BULLETIN, Vol. XXXVII, No. 7), in that it is not exclusively devoted to the "more (or less) than civil" wars between the Spaniards in Peru during the years 1544 to 1548. A number of chapters towards and at the end of the volume contain geographical, and especially ethnographical, information. The latter is mostly presented in Chapters LVIII, LIX, LX, and LXI, and the topography is treated from the standpoint of the time. The author divides the mountains of Western South America into the coast range, the Sierra or mountain tablelands, and the Andes proper. This is the same division so well described in 1534 by Pedro Sancho in his valuable report written by direction of Pizarro to the Emperor from Xauxa. But Gutierrez, although more detailed than Sancho, is far less vivid and skilful than Pizarro's secretary. The ethnographic sections teem with information, which, however, must be taken in many instances with great allowance. While the writer claims to have obtained most of it from aged Indians thoroughly versed in ancient lore, many of his statements are so utterly at variance with what other Spaniards, much better situated than Gutierrez, made it their official duty to secure (like Betanzos) that it will require material as yet unknown or inaccessible to establish the reliability of his statements. Thus the tale of the origin of the Inca tribe from Lake Titicaca and its islands, while given by Gomara (and possibly copied by him from Gutierrez or the anonymous *Conquista y Población del Peru*) and already foreshadowed by Oviedo in part, is at variance with the oldest reports on inquiries among the Inca shamans, and is only in part supported by the tales of Garcilasso de la Vega. Still, it is valuable, as explaining the difference between the stories contained in Gomara and Levinus Apollonius, and those of the majority of Spanish writers on ancient Peru, Garcilasso, Cabello Balboa, and Anello Oliva perhaps excepted. At any rate, the book of Gutierrez adds a few more interrogation-points to the already very confusing material extant about the Incas, their origin, and the series of their war-chiefs.

Were we to judge of the general reliability of Gutierrez from his elaborate account of the pre-Columbian landing of "giants" on the southern coast of Ecuador, the judgment could only be unfavourable. He devotes the last chapter of this book to that very interesting and probably ante-Columbian Indian folk-tale. But he does not, like Zárate and Cieza, limit himself to an objective treatment; he elaborates the story in the manner of Oliva's handling of the tale of Manco Capac, adding (while protesting that they are Indian and primitive) details which on their very face appear foreign to the primitive tradition. Thus he places the landing of the giants at about a century previous to the arrival of Pizarro, and shows himself, at the same time, to be sadly mixed up in the geography of the country! It may be that he wrote such parts of his work at a much later date, which would explain some errors and contradictions.

The period covered by the historical sections is that between the departure of Francisco de Carbajal from Quito and his expeditions against Centeno and Mendoza. He enters into minute details about every act of Carbajal, and places before the reader a most vivid picture of the intrigues constantly going on among the Spaniards. He also furnishes proof that Carbajal and Pedro de Puelles were urging Gonzalo Pizarro to have himself proclaimed monarch of Peru. It was, perhaps, a grave mistake on the part of Gonzalo not to have followed the advice. Under any circumstances he would not have been worse off. As to the picture Gutierrez presents of Carbajal, it is, in this volume, painted by one who saw in the great soldier of Gonzalo Pizarro (for such a qualification cannot be denied to Carbajal) first the chief traitor, next a fiend incarnate, and in both Gutierrez certainly is right. To find a parallel to the career of daily butchery (of Spaniards chiefly) Carbajal followed up to almost the end of his life we must turn to the expedition of Pedro de Ursua of 1560, after the latter had been murdered, and the exceptional monster, Lope de Aguirre, secured control of the "Marañones." Not in vain had Lope de Aguirre served under Carbajal.

It is not to be wondered at if, in this third volume, Gutierrez shows more of a partisan feeling than in the preceding ones. The faithful vassal and the man of ordinary humane feelings could not, without indignation and just wrath, describe the awful doings of an octogenarian, whom age, in addition to a life spent exclusively in wars of all sorts, had converted into a superior killing-machine. Such a one Carbajal had become. He prided himself on it, and his faithfulness to the cause of Gonzalo Pizarro justified in his own eyes the ferocity of his deeds.

It is with something like impatience that we look forward to the remaining two volumes of this highly interesting and valuable work. A. F. B.

Trois Mois de Campagne au Maroc, Étude Géographique de la région parcourue. Par le Dr. F. Weisgerber. 44 illustrations. Cartes, Photographies, Dessins. Ernest Leroux, Editeur. Paris, 1904.

Both author and publisher are to be congratulated; the author on having written a book at once timely and instructive on a little-known subject, the publisher on the handsome style in which the work is produced.

After a brief introduction the author divides his work into three parts: The first, from Casablanca to Sokhrat-el-Djeja; the second, the M'halla or imperial camp, the Sultan, the Makhzen or Government, the army and life in camp; the third from Sokhrat-ed-Djeja to Marrakesh. The appendix, usually a sort of scrap-bag in books, is an attractive feature of the volume, being a serious geographical study of the almost unknown region traversed; its orography, hydrography, geology, climate, flora, fauna, and population.

The reader will share the author's astonishment that this large and rich country of Africa, the nearest to Europe, should still be almost a *terra incognita.*

The explanation is found in the political conditions; this vast territory of over 200,000 square miles, with a population of, perhaps, ten millions, being without the cohesion of a European state. The effective authority of the Sultan has never extended over a third of the country, which is divided into *Bled-el-Makhzen,* or country of government, and *Bled-es-Siba*, or country of the unsubdued and roving independent tribes.

The Bled-el-Makhzen consists of the *Gharb* and the *Houz,* the ancient kingdoms of Fez and Marrakesh, comprising the greater part of the region between the

Atlas and the Ocean. The plains and cities, above all, recognize the Sultan as political and religious chief, and pay tribute.

The Bled-es-Siba consists of the Rif coast range, the Jebala, the wooded mountainous region of Braber, south of Fez and Mequinez, and thrust in like a wedge between the Gharb and the Houz, almost reaching the sea near Rabat, and, finally, the Atlas chain and the vast regions of the desert beyond. This immense territory is peopled by independent tribes, some of which recognize the Sultan as *imam* or sovereign pontiff, and send him presents on the occasion of Mussulman fêtes. The greater number, however, refuse to acknowledge him as their spiritual head, and no one tribe admits his temporal sovereignty.

Even where the Sultan reigns as autocrat revolts are not rare. The cause of the insurrection is nearly always the same; the exactions and injustices committed by the *Caïds,* or Governors, who, having purchased their posts, *squeeze* their protégés. The exasperated tribes refuse to pay the tax and rebel, with the result that troops invade their territory, pillage and destroy and cut off heads. When the insurrection is serious the Sultan, accompanied by his Court, leads his army against the rebels.

Dr. Weisgerber believes that Morocco will not be able to recover herself. The events of the past two years have left the Sultan in a precarious position. In the north the insurrection of Bir Hamara controls the Rif and the northern Braber. The communications of Fez with Tafilelt are severed; the Jebala make incursions into the plain; the Western Braber infest the region of the Gharb and the approaches to Mequinez, Sale, and Rabat; and there are serious risings in the Sus. On all sides the independent tribes are pressing upon the "country of government." If Morocco is to be saved the power of the Sultan must be supported from without, and the author believes that the task will necessarily devolve upon France.

The occasion of Dr. Weisgerber's journey was the serious illness of the Grand Vizier in the camp at Sokhrat-ed-Djeja. There was no physician in the Sherifian army, and Dr. Weisgerber was summoned to attend the illustrious patient.

Casablanca, the starting-point of the journey, lies midway between Cape Spartel and Mogador. It is a purely commercial town, with narrow streets and with no striking monument.

In three days the Sultan's camp was reached, and there Dr. Weisgerber remained for three weeks. The time was January, 1898; the rains were incessant, and the cold was very great. The army had occupied the ground for two months, and it was a foul quagmire. The troops had ravaged the country. The animals, and especially the camels, were dying for want of pasture, and where they fell there they lay. Dr. Weisgerber, wandering one day by the brook which flowed past the camp, found it choked with dead bodies, and saw the water-carriers quietly filling their skins from the stream below the obstruction.

When the campaign opened the Government paid eight dollars for a prisoner and four dollars for the head of a rebel; in January the rates had fallen to two dollars and one dollar. Occasionally a party returned from a raid in the mountains bringing prisoners and cattle and carrying on bayonets the heads of victims, to be salted and distributed throughout the empire by way of warning to the ill-disposed. The captured slaves—and sometimes also free women and children—were led through the camp and sold to the highest bidder.

The fate of the other prisoners in such cases is miserable enough. They are kept for a time in the camp, until it is found that they cannot or will not pay the price of their ransom, and then they are sent to the prisons of Marrakesh, Moga-

dor, or Rabat, where they are shut up without air and without light till their ransom is paid or they perish.

Dr. Weisgerber saw six hundred of these unhappy beings, each with an iron collar fastened to a long chain which bound the victims together, with about twenty inches space between them. That they may be inspected more easily, they are forced to keep themselves crouched in an enormous spiral, and so closely huddled one upon another that they can only move in a body. They are poorly clothed, and some are quite naked, and so they lie in the mud and the rain and the cold wind. There were children among them. They are fed on cakes of barley meal, and once a day the bodies of those that succumb are removed from the chain. When Dr. Weisgerber first arrived at the camp the deaths among the prisoners numbered ten a day; in the last four days of his stay there were a hundred deaths.

By the last week in January the camp broke up. The district was pacified; the taxes and the war contributions had been levied, the country was devastated, and the inhabitants were scattered and reduced to misery.

The day of the departure Dr. Weisgerber stationed himself, with his attendants, on a little eminence, to see the march of the army. The white tents disappeared as by enchantment, the great imperial tent standing alone for a time. At last this was struck and packed on mules, and the disorderly multitude began to move; camels and mules, the Sultan's horses led by slaves, infantry soldiers, chains of twenty and thirty prisoners, horsemen with long guns, negresses riding astride on mules, and then the Sultan's harem, surrounded by a guard of eunuchs armed to the teeth and crying: "Room for the wives of our lord!"

Behind the harem a troop of horsemen and standard-bearers preceded the Sultan, who wore a snow-white burnoose and rode a black horse, with trappings of green and gold. An attendant followed, holding above the Sultan's head an enormous red silk parasol. The Grand Vizier rode near the Sultan, and then came a closed litter covered with leather and borne by richly-caparisoned mules. Four magnificent horses, saddled and bridled, were led by grooms; after these came the dignitaries of the Court, the military band, and an escort of the Sultan's black bodyguard.

It is something to have seen the simple methods of government in operation in Morocco. CH-L.

Japan. Nach Reisen und Studien im Auftrage der Königlich Preussischen Regierung dargestellt von J. J. Rein, Professor der Geographie an der Universität Bonn. Erster Band: Natur und Volk des Mikadoreiches. Zweite, neu bearbeitete Auflage. Mit 2 Abbildungen im Text, 26 Tafeln und 4 Karten. Leipzig: Verlag von Wilhelm Engelmann, 1905.

In few parts of the world have the last decades brought about so many vital changes as in the empire of the Mikado. This second edition of Professor Rein's Japan, long recognized as authoritative, has therefore been greatly enlarged, partly rewritten, and in many parts become almost a new book. In its new form it is again the most complete, reliable, never-failing reference book on the country and its people, from the legendary creation of the islands to the outbreak of the Russo-Japanese war. The first volume, which has just been published, is the more strictly geographical one, while the second deals with the commercial and economic conditions of the country. It is impossible, of course, in a mere review of such a book to do more than pick out at random points which seem

to be of the most general interest. The volume consists of two divisions—the country and the people, respectively. The former deals with the location, natural and political divisions, coast-line, border oceans, ocean currents, geology, physiography, hydrography, climate, flora, and fauna of the Japanese islands; the latter with the history, anthropology, and ethnology of the nation, and the descriptive geography of towns and cities having more than 20,000 inhabitants. An especially valuable introduction gives a vocabulary of Japanese words, which occur frequently in geographic names.

In the spelling of names the author uses the English transcriptions, with the exception of Tok*i*o and K*i*oto, which is the accepted French spelling, and which, in accordance with Sir Ernest Satow, he considers a better equivalent of the Japanese sound than Tok*y*o and K*y*oto. Long vowels are marked ā, ē, ī, ō ū.

Japan of to-day consists of two natural and historical divisions: Old Japan—viz., the territory of the feudal times, from 1600 down to the middle of the 19th century, and the islands, of more or less colonial character, which were acquired during the last century. Old Japan includes: (1) Honshu ("main land"), or Honto ("main island"), or Hondo ("main part"); (2) Kiu-Shū ("the nine provinces"); (3) Shikoku ("the four provinces"), and (4) the lesser islands of Sado, Oki, Tsushima, Awagi, and Iki. It is these eight islands which were comprised formerly by the name of Oyashima ("the great eight islands"), and to which latter the name of Japan was first applied.

The history of this name repeats in an interesting way that of the country itself. Its original root is the Chinese *Dji-Pēn* ("origin of the sun"), or *Dji-Pēn-Kuë* ("land of the origin of the sun"—the Levant of the Chinese). With the extension of Chinese influence and civilisation across the Japanese Sea, *Dji-Pēn* was adapted to the Japanese tongue as Nihon or Nippon (Jap. "nitsu"=sun, "hon"=origin), or Dai- ("great") Nippon. Dji-pēn-kuë, on the other hand, became the "Zipangu" of the Middle Ages through the Italian rendering of Marco Polo, and the "Cipango" of the later Spanish chroniclers. When, in the 17th Century, the Portuguese and Dutch missionaries re-discovered the islands, they transcribed the name as Ja-pón or Ja-pán, respectively.

The Germanic tongues prefer the form *Japan*, the Latin tongues take *Japon*. The Japanese continue to use the name Nippon, not for the main island, but for the whole empire, and call themselves Nippon-Jin- ("jin"=people).

The natural divisions of the more recently acquired parts of the empire are: (1) the Riu-Kiu (Chinese Liu-Kiu) Islands, acquired in 1876; (2) Formosa ("the beautiful one"), and the Pescadores Islands, acquired in 1895; (3) Hokkaidō ("North district"), which was declared a colonial province in 1872 and includes (*a*) the island of Hoko-shu (North land), wrongly called Yezo on most maps, (*b*) the Kurile Islands, and will now probably receive the further addition of (*c*) Southern Sakhalin. As to Yezo, this name is used by the natives exclusively to designate *a tribe of Ainos* in the northern part of the island wrongly so named; Hokkaidō is the name used for the island by the Japanese. Unfortunately this name, like many other popular names, is not very strictly limited; it sometimes refers to the island alone, and sometimes to both this island and the Kuriles. Professor Rein suggests the adoption of a definite geographical name for each, proposing for this island alone the name of Hoko-shū (corresponding to Hon-shū,) so that Hokkai-dō may be reserved for the district. This sensible suggestion ought to be endorsed by geographers in general.

These natural divisions, a knowledge of which is indispensable for understanding the development of the country, have now been supplanted, however,

by a modern division into administrative districts ("ken"), in much the same way as the old French provinces were superseded by the department system. There are forty-six "ken" in all, to which are added the "Fu" or capital districts (Kiōto, Tōkiō, and Osaka) and twenty-one "colonial" districts or "Chō" (in the Formosa and Hokkai-dō divisions).

The Japanese consider themselves and their country of divine origin. Their legends relate that the god Izanaga dipped his lance into the ocean, and the drops of water falling from it into the sea formed the Oyashima Islands, Awa ji first. On this the god settled with his wife Izanami, another Adam and Eve, and they had five children. Their most beloved daughter Amaterasu—Omikami, goddess of the sun, and to this day the special patron goddess of the people—was the grandmother of Ninigi-no-Mikoto, who was sent from Heaven to rule the islands, and from him descended Jimmu-Tennō, the first historical Mikado (660-585 B. C.). Tennō (Chinese "ten"=Heaven, "ō"=king) has since been part of the name of every Mikado and is still his title among the common people. Like the Chinese, the Japanese considered their country the centre of the world as long as the rest of the world was more or less unknown to them. Of this belief the name Dai-Nippon bears evidence, and in proportion as education and travel have widened the horizon of the nation the prefix has gradually been dropped.

The historical part of the book will perhaps be the most interesting for the general reader; it must certainly be ranked with the most fascinating reading not belonging to fiction. The author distinguishes eight periods in the national history, limited respectively by the years 600 B. C.-794 A. D.; 1199-1333-1573-1600-1853-1868-Present. Among the more or less legendary records of the first period, the earliest attempts to conquer Korea and the introduction of Chinese civilisation and of Buddhism are undoubtedly historic. The second period includes the age of feudalism and military despotism, the rivalry of the great clans of the Fujiwara, Taira, and Minamoto; the establishment of the position of Shō-gun as an hereditary office whose holder, while originally a mere commander general and nothing more than the first vassal of the Crown, became *de facto* the unlimited ruler of the nation, reducing the Mikado to a mere dummy on the throne. The Shō-guns themselves find their masters in the third period, when the Hōjō clan, holding for years the office of Shikken (Prime Minister) terrorised the Shō-guns as those had the Mikados, both Mikados and Shō-guns being children under age, whose name lent official sanction to the doings of the despots, and who were dispatched to a monastery as soon as they grew of age to be replaced by another minor. This scandal was stopped in the fourth period, when the Ashikaga family got hold of the Shō-gunate and re-established its former power after defeating the Hōjōs; in this period, also, the first visitors from Portugal appeared on Japanese shores and the first missions were founded by the Jesuits. This is followed by another period of civil wars and feuds between various usurpers on the seat of power, during which, however, occurs the conquest of Korea through the famous General Hideyoshi. The sixth at last is again a period of peace under the Shō-gunate of the Tokugawa family, whose greatest representative, Iyeyasu, lays the foundation for order and prosperity through his famous code of laws; but the desire for consolidation and unification of the empire also leads to the persecution of the Christians, not so much for religious as for political reasons, and to the exclusion from contact with foreign nations. Then the seventh period brings the awakening of the nation after Commander Perry's visit, the abdication of the last Shō-gun, and the reinstatement of the Mikado in political power, and the eighth and last period is identical with the reign of the present Mikado, Mutsuhito, the

period of the absorption of Western progress, of the various crises which the country underwent through the new régime, and the clashes with her neighbours on her way to expansion. Through all of these records, from the earliest dawn of history to modern days, the heroic element is prominent, and certain phases and features of the events most strikingly recall parallels from Western histories. There are Japanese King Arthurs and Bayards, Wars of the Roses, feuds between Guelphs and Ghibellines, Napoleons and Gambettas. Nothing can demonstrate better than this history how much, in spite of all the differences in race, civilisation, and culture, the Japanese have in common with the Western world.

Ethnologically, Professor Rein distinguishes two types among the population: the first a fine, slender one, reminding us of the Korean and Manchu build, with an oval face, slightly protruding jaws, a finely-curved nose, etc.; the other a shorter, more broad-shouldered type, with a round face and plain nose, resembling in a striking way the Malays of Annam, Siam, and Java. The Ainos can no longer be classed with the Mongolian races; they may even possibly be Caucasians. The most important discovery concerning them was recently made through a study of geographic names, which proves that, at some remote period, they must have inhabited all of Old Japan. Old burial mounds and kitchen middens support a theory that probably the slender, Manchurian-like race immigrated from Korea to Kiu-shū and, taking more and more possession of the country, drove the Ainos farther and farther back to their present restricted area in the North. For the origin of the Malay component nothing equally convincing can be said, yet the resemblance with the inhabitants of Indo-China in stature, dress, character, and customs is so striking that the theory of an immigration from there *via* Formosa and the Riu-Kiu islands seems perfectly legitimate in the absence of further evidence.

The Japanese language, too, is a mixture of two different components: the original Japanese idiom ("Yamato-Kotoba") and Chinese. From the two the modern Japanese ("Nippon-no-Kotoba") has developed, not by amalgamation, as English has from Norman and Saxon elements, but by mere agglomeration. In the written tongue the Chinese component is still so visible that a Japanese and a Chinese may understand each other by means of a written conversation, while they will not understand one spoken word. It is greatly to be regretted that at the time when Japan first felt the need of a written language there was nothing but Chinese at hand to borrow from. The adoption of any European alphabet would certainly have been just as efficacious for rendering the sounds, and would at the same time have allowed the language more freedom and flexibility than it now has. With all its harmonious sounds, the language is so little developed that scientific publications simply have to be written in a Western language, because it is an absolute impossibility to express in Japanese the fine shades and relations of thought needed to express the results of abstract scholarship. The language is like a clumsy tool, with which even a skilful worker can reach only imperfect results. A number of expressions needed in order to bring the vocabulary up to the wider intellectual horizon have been borrowed from the Chinese; but even this remedy is not always satisfactory. Yet the suggestion sometimes made to adopt English as the national idiom have naturally met with grave objections, which are not likely to be soon overcome.

As to the purely geographical and topographical parts, too much detail is involved there to make even a flying review possible. It remains true of these chapters, as of the whole book, that they cannot be excelled for completeness and thoroughness. While it is to be hoped that the English translation of the first

edition may soon be brought up to the standing of this second, it may be said here that the style of the original possesses in a high degree the qualities of clearness and simplicity, so that no one with a fair reading knowledge of German need fear to attempt the original.

M. K. G.

Forest and Climate.—The Primer of Forestry, by Mr. Gifford Pinchot, is a book of 176 pages, in two parts, distributed by the U. S. Government. The first part, dated 1903, deals with *The Forest;* the second, dated 1905, is entitled *Practical Forestry.* There is much information in these two little volumes, and they should be generally read. The second part, but recently published, contains a chapter on *The Weather and the Streams* (Chap. III, pp. 56-73), in which a well-written summary of the relations of forests and climate, and of forests and stream-flow, is given. It is clearly pointed out that much has been written and said on the relation of forests and climate without proper basis of fact, which in this case is a series of accurate meteorological observations, continued for a sufficient length of time to make it certain that any apparent changes are not simple periodic oscillations, without definite progression in any one direction. The effect of the forest in lowering the air temperature; in moderating the extrèmes; in increasing the relative humidity; in decreasing evaporation, are all noted. The most important question of all, the effect of forests upon rainfall, is treated with proper caution. Emphasis is laid on the difference in the catch of rain as the exposure of the gauge varies, and on the contradictory conclusions which have been reached as regards the relation in question. This part of the subject is hardly as fully treated as its importance warrants, but the space is limited. "Whatever doubt there may be," says the author, "about the action of the forest in producing rain, there is none about its effect on rain-water after it has fallen," and then a series of illustrations and well-chosen comments bring out the relation of forests and stream-flow.

In the first part of the *Primer* (Chap. II, pp. 25-30) the various requirements of trees as regards temperature, moisture, exposure, etc., are briefly touched upon.

R. DeC. W.

Jungle Trails and Jungle People. Travel, Adventure and Observation in the Far East. By Caspar Whitney. ix and 310 pp. and 37 half-tone illustrations. Charles Scribner's Sons, New York, 1905. (Price, $3.)

Mr. Whitney's reputation as a writer of books of travel and adventure that are both entertaining and valuable was established long ago. It is a far cry from the monotonous bleak and snow-buried lands of northern Canada, the scene of one of his most notable books, to the wildernesses of the tropical Orient, with all their great variety, which he now describes. Mr. Whitney certainly found among these jungles more promising materials than the frozen north afforded him; and he tells in his best manner much that is often novel and always interesting about the human and the brute life that he saw during his wanderings in India, Sumatra, Malay, and Siam. He took part in a short campaign of elephant-catching in Siam, went tiger-hunting in India, and had many other adventures of the Nimrod type, with plenty of the excitement of killing big and formidable game; but he says himself that he never presses the trigger excepting to get needed meat or an unusual trophy, and the book shows that his studies of wild human life, during his wanderings, were of more interest to him than the mere destruction of game. Mr. Whitney has written no more interesting or informing book than this one. The illustrations are characteristic and excellent.

From the Cape to the Zambesi. By G. T. Hutchinson. Introduction by Col. F. Rhodes. xiv and 202 pp., 31 Illustrations and Index. John Murray, London, 1905. (Price, 9s.)

This book is worth reading by everybody who cares to keep in touch with South African progress. That region is to-day in a state of constant change, for it is a country in the making; and we have seen no book from which so much may be learned about the present prospects there as from this volume. About one-third of it is given to Rhodesia, a country that is larger than France and Spain together. Much of it is adapted for white occupancy, and all of it is now in the pioneer stage of development.

Other chapters especially filled with information and deduction are those on Cape Colony, Kimberley, the Victoria Falls, the native and land questions, and the gold-mining interests. We gain a good idea, for example, of the variety of causes that have brought about the present depression, following the boom period just after the war. We learn of the enormous influence of the De Beers Diamond Mining Company, which actually controls Kimberley, and provides a large part of its municipal revenue. The author gives a very interesting account of the serious dispute that has arisen between the 12,000 white settlers of Rhodesia and the British South African Company, which governs them. It remains to be seen, as he says, whether the Chartered Company will be content to abandon all hope of immediate profit, to take up the difficult path of retrenchment and reform in Rhodesia, and look for reward in its future greatness. He discusses all phases of affairs there, and expresses the view that in the matter of roads, hospitals, postal and telegraphic systems and public works generally, Rhodesia is better equipped than any other country of its age.

Tourists are now flocking to the Victoria Falls of the Zambezi, and, in Mr. Hutchinson's opinion, "The new hotel, the Canadian canoes, the crowds of camera-laden visitors, or the scene of bustle and activity at the railway station and the bridgehead, all appear singularly out of place; indeed, the Victoria Falls had been described by one, who knew them in the old days, as 'a mass of water surrounded by tourists.'"

The illustrations are admirable.

Canada As It Is. By John Foster Fraser. 303 pp., 47 full-page Illustrations from Photographs, and Index. Cassell & Company, New York. (Price, $2.)

Mr. Fraser is a British journalist and novelist who has travelled nearly everywhere, and describes what he sees in a breezy way with many bits of shrewd observation. He shows us a panorama of Canada from sea to sea. He seems to touch everything in a light and jaunty manner, but for all that he gets beneath the surface, and we really garner the essence of many things. No one who is familiar with the fruit fields of the Niagara peninsula, the wheat plains of the central region, the glories of the Canadian Rocky Mountains, the cañon of the Fraser River, or the various types of the Canadian people, will say that his word-pictures, sketched though they be with a few strokes of the brush, and lacking in detail, are not the truth after all, and, generally, the part of it best worth knowing. The book is handsomely illustrated.

A Commercial Traveller in South America. By Frank Wiborg. xv and 159 pp., 9 Illustrations, and Index. McClure, Phillips & Co., New York, 1905. (Price, $1.)

A readable little book, giving a business man's impressions of South America

as seen at its most important seaports and on the journey by rail across the continent from Valparaiso to Buenos Aires. Mr. Wiborg eschews statistics, and there is not a dull page, even though the author keeps an eye out for facts of special interest to his compatriots who are looking southward for trade openings. Crossing the Isthmus of Panama, he made many stops on the west coast of South America as far as Valparaiso, where he crossed the Andes and the Pampas to Buenos Aires, and then went up the east coast.

He shares the opinion, now generaly held, that with the strict sanitary measures and modern sewage system now being introduced, the Isthmus and City of Panama will be transformed into a pleasant and healthful place to live; and he speaks of the pampas of Argentina as the finest agricultural country in extent and richness that he saw in South America. The concluding chapter is given to observations on our trade with those countries. Our business relations there, in his opinion, require better and direct transportation facilities, a better system of banking and collections, more competent business agents and greater care in the filling of orders. Geographically there is nothing new in the book, but it presents in an agreeable way a good deal of information, and is differentiated from other books by the author's point of view.

The Geography of New Zealand. Historical, Physical, Political, and Commercial. By P. Marshall. x and 401 pp. Maps, Illustrations and Index. Whitcombe & Tombs, Limited. Christ Church, N. Z., 1905 (?). (Price, 4s. 6d.)

This is a description of one of the most interesting of countries, according to the spirit of the new geography, as defined by Dr. Mill when he wrote:

> Geography is the science that deals with the forms of relief of the earth's surface and with the influence which these forms exercise on the action of all other phenomena.

Prof. J. W. Gregory introduces the book with a fine chapter on the geographical plan of New Zealand—its continental structure, the variety of its land-forms, its mountain and volcanic systems, etc. Part 2 (30 pp.) deals with the physical geography, the origin and development of the relief forms, the influence they exert upon the distribution of land and water areas, their effects upon the distribution and nature of the plants and animals, and, in conjunction with the distribution of minerals, upon the areas occupied by man and the nature of his industries. Part 3 (88 pp.) considers the political institutions and economic geography. Prof. Gregory also contributes the chapter on Geysers, Mr. G. Hogben the chapter on Earthquakes, and the description of the Maori is supplied by Mr. A. Hamilton.

The book is copiously illustrated with maps and photographic half-tones. The author admirably carries out his plan of treatment; and as these islands present a remarkable collection of typical geographic models, such a book cannot fail to be very suggestive to teachers and writers as to some excellent methods that may advantageously be followed in dealing with other countries.

The Other Side of the Lantern. An Account of a Commonplace Tour Round the World. By Sir Frederick Treves. 419 pp. and Index, 40 Illustrations from photographs by the author. Cassell and Company. New York, 1905. (Price, $5.)

A volume that will take its place in the first rank of recent books of travel by reason of its charming style and sustained interest. The author's descriptions are never tedious nor overweighted with detail. His route around the world did not leave the beaten track; but his impressions are fresh, and he imparts them

in a pleasant manner. He was presented to the Emperor and Empress of Japan, and has this to say of them:

The Emperor was dressed in a dark military uniform very like that of a French general. He is the 122nd member of his family, in unbroken line, who has ruled over Japan. His appearance is familiar through published photographs. His face remains immobile, and, if one may say so without disrespect, it is expressionless, impassive, and mask-like. As his Majesty does not speak English, his questions and my answers were interpreted by one of the Lords-in-Waiting. The etiquette of the Court requires that the conversation should be in so low a tone as to be practically whispered. The Emperor was good enough to ask about my journey and my impressions of Japan. He made enquiries as to the health of His Majesty the King of England, and asked me much as to my opinion of the Japanese military hospitals, medical field equipment, and the like.

Her Majesty the Empress received me in an adjacent room, in which she had already graciously received my wife and daughter. She was attended by her Lord Chamberlain and three Ladies-in-Waiting, who were all in European dress. The Empress, whose face is most vivacious and alert, also speaks no language but Japanese. The conversation I had the honour to hold with her took place through the medium of a Lady-in-Waiting, and was conducted in a whisper.

Lectures on Commerce. Delivered before the College of Commerce and Administration of the University of Chicago. Edited by Henry Rand Hatfield. Vol. 1 (second edition). viii and 287 pp. and Index. The University of Chicago Press, Chicago, 1904. (Price, $1.50.)

In the introductory lecture treating of the "Higher Commercial Education," Prof. Laughlin says that the essential aim of a college of commerce should be not only to give useful information, but also to give the knowledge of underlying principles and that mental grip which will provide the possessor with the capacity to meet comprehendingly new problems. Five lectures follow on railroad management, operation, and problems; five on trade and industry—The Steel Industry, History of the Art of Forging, Commercial Value of Advertising, Methods in Wholesale Business, and The Credit Department of Modern Business; and five on Banking and Insurance—The Comptroller of the Currency, Methods of Banking, Investments, Foreign Exchange, and Fire Insurance. These lectures were given by men of affairs and of eminence in their callings, who from their long and rich experience contributed in this manner to acquaint students with some of the practical aspects of business. All the advanced commercial courses in our schools may profit by these authoritative series of lectures.

Ethiopia in Exile. Jamaica Revisited. By B. Pullen-Burry. 288 pp. T. Fisher Unwin, London, 1905. (Price, 6s.)

The book deals with the life and conditions of the negroes of Jamaica and the United States. The Jamaica chapters occupy about two-thirds of the space, and include, besides the main topic, a large amount of information on the present state and prospects of the island, with many suggestions to tourists as to what to see. The tourist traffic is rapidly developing, and many Americans are flocking there. On the whole, the author, an English lady, gives a favourable impression of the Jamaica negroes. An increasing number of the descendants of the former hard-working slaves are becoming owners of land and are learning to cultivate the soil intelligently and profitably. Illiteracy is gradually being stamped out, with other objectionable features handed down from the semi-savagery of slavery. This progress, observes the author, is in marked contrast with the backwardness of most of the other Caribbean negroes, but it does not imply as much advance as the study of the African race in the United States reveals. An able and careful summary of the negro problem in our country, occupying about 100 pages, is based upon the author's own investigations and the authoritative data and opinions thus far published. The book is written with more than ordinary breadth of view and in a scientific spirit.

BULLETIN

OF THE

American Geographical Society.

Vol. XXXVII **1905.** **No. 12**

FROM TIFLIS TO TIBET.

BY

OSCAR T. CROSBY.

My stay at Tiflis is notable in memory for one loss and one gain. The loss was my illusion concerning the beauty of the Georgian women; they are comely, with symmetrical features and dark complexion, and they are prettily gowned; but one begins already, even in this rather superior Asiatic type, to miss that fineness of feature and expression to which the high development of feminine beauty in Europe and America has accustomed us. Early travellers who have rhapsodized over these and other Eastern women may have been somewhat affected by the fact that they approached them much more laboriously and tardily than is now necessary. To-day Tiflis may be reached in four or five days' railway journey from Paris, with but a two-days' drive over the Caucasian Mountains from Vladikavkaz. Thus the Caucasian beauty is put into immediate juxtaposition in one's mind with the more perfect type in France. My gain at Tiflis consisted in a companion, (Captain Anginieur, of the French Army), who was about to go upon a railway journey in Asia Minor and the Turkestan region, and, becoming much interested in my plans for venturing into Tibet, he obtained permission from Paris to accompany me, and did so to the end.

Knowing that the approach from the south through the Bhutanese, Sikkim, and Nepal territory was impossible by reason of the objections of the people and the agreed policy with them on the part of the British Government to prevent incomers from passing their territory, and learning from Mr. Rockhill, our American authority on such questions, that, in his judgment, the eastern approach to Tibet from the interior of China was still an impossible one by reason of

the Boxer troubles, it became necessary to consider the northern approach. Because of the very great width of the Gobi Desert,—stretching over one-half or more along the northern line of Tibet, it seemed the most arduous route would be that, leaving the Trans-Siberian Railway at any convenient point, such as Irkutsk. Hence, one is brought around to the Trans-Caspian Railway and the approach through Russian Turkestan over the Alai Mountains into Chinese Turkestan; thence climbing the Kuenlun Mountains at some point; thence to venture upon the great high desert of Northern Tibet. With this route then in view we crossed the Caspian Sea to Krasnovodsk, the western terminus of the Trans-Caspian Railway, and there I was delighted to learn that a small private car had been placed at my disposal by the authority of the Russian Minister of Railways at St. Petersburg—a courtesy which it is my pleasure to acknowledge, since it seems to have been granted solely by reason of the representations made by our Embassy at St. Petersburg.

The long, hot, dusty journey over the blank deserts is first relieved by the passage of the Amu Daria—the ancient Oxus—but the first point at which we thought it worth while to stop was Bokhara, a city renowned for ages in the history of Central Asia, and, until very recently, closed to Europeans. The people are still very fanatic Mohammedans, but as their state is now protected by the Russian power, it is possible and entirely safe to go anywhere in its crowded bazaars.

Next comes the lordly Samarkand, once the capital of Tamerlane, and the site of the only considerable architectural monuments which we meet in Asia until we reach China on the one hand or India on the other. The most beautiful structure left here by the great conqueror is one dedicated to the memory of his wife—of his favorite among many. The thought of it came back to me when, months later, I worshipped the beauty of the Taj Mahal, at Agra, in India. Here again was a woman's tomb, witness of an Emperor's love—a love won in fair competition. Thus, in polygamous Asia, the two most splendid monuments built by man declare the influence of woman. Then the system cannot be altogether destructive of her happiness, her value in life. After Samarkand, Andijan, famous only because a few years ago some ten or twelve thousand people were destroyed by earthquake. Its houses still are found in the ruins which, however, the industrious Russians are sweeping away for rebuilding, as Andijan is now a terminus of the Trans-Caspian Railway, 1,500 miles from the Caspian Sea. A day's drive brought us to a post where the Russian commanding officer permitted us

to start away with the modest outfit of nine ponies hired to carry us as far as Kashgar, twelve days' journey over the Alai Mountains into Chinese Turkestan.

Kashgar, Yarkand, and Khotan—these are the three great towns which one passes skirting the Taklamakan Desert. Passing through artificial oases which irrigation has produced and which are studded along the blank desert sands where they crowd upon the cultivated fields and in times past have destroyed more than one populous city, we reached Kashgar. Here we reorganized our caravan completely, purchasing some ponies and hiring new men. The very difficult question of an interpreter came before us and never received a satisfactory solution. The natives speak the general Turki tongue, which holds all over Central Asia. One European tongue—Russian—is now and then heard in the mouth of an officer's servant. As we knew only two languages—English and French—our state was very trying. At the last moment, however, a boy of seventeen appeared and paraded a vocabulary of something like twenty-five words of English, which he had learned from a Swedish missionary. Had we not been quite desperate it would have been folly to engage him, but under the circumstances it was a necessary step, promptly taken.

In all the preparations here we were very much aided by Colonel Miles, the sole Britisher to be found in all the vast regions of Central Asia, there to represent as best he may, against the preponderating influence of the Russian Consul, the dwindling commercial interests of India. The presence of sixty Cossacks as a Consular guard, together with the knowledge on the part of the Chinese officials, that there are many other robust soldiers on the other side of the Alai Mountains, gives to the Russian official at this station an authority which is a certain humiliation to the Chinese Taotai who administers this region.

At Khotan I became the fortunate possessor of a lot of precious ancient manuscripts,—a portion of those extraordinary finds which began with Sven Hedin and almost ended with the wholesale work of Dr. Stein, sent from Calcutta for that purpose. It is highly probable that all save the pieces which I brought back will find their way into European libraries, and my gratification was considerable, therefore, in being able to place in our own Congressional Library and at the disposal of American scholars what are probably specimens of the oldest paper bearing written characters in the world. There are Egyptian and other papyrus documents that are older; but there is a certain interest attaching to these finds, aside from their nature as records, in that the material is ordinary Chinese paper preserved

for probably 1,500 years or more under the dry sands which, at some far day, were swept over cities which were then flourishing Buddhist communities, and have there lain, until the keenness of the European for this sort of thing and the excavation done by the explorers above mentioned have caused the past to reveal itself in the most interesting fashion. Portions of these manuscripts which are in Europe are being slowly deciphered, and they are found to contain Sanskrit, which is, of course, familiar to students, and two other languages which are known merely as Central Asian languages now extinct. One has been deciphered by Dr. Hoernle, of Oxford, and he will in time, with such assistance as may come to him from other students, go over the whole mass. These are striking evidences, since they come from distances of something like 150 miles north of Khotan, of the wider extent of cultivated area, or, rather, the wider extent in which oasis-making was possible in the early part of the Christian Era. This shrinkage of the habitable area, due to the filling of the irrigation ditches, the change in the direction of streams, and the overwhelming of houses by sand, is a key to some of the riddles of those migrations which were so important eventually in determining the development of Europe itself, and, hence, of America. Neither in Yarkand nor Khotan is there any European resident; nor had there ever been, so far as I know, an American in Khotan, although a number of Europeans have made the city within the last ten years fairly familiar to students of travel. Here we said good-bye to the last courteous Chinese official with whom we had to deal and were off for Polu, a little village lying at the foot of the Kuenlun Mountains, visited in the past by four white men, and the scene of two unsuccessful efforts (ours making the third) to use it as a point of departure for any long journey across the Tibetan desert. We obtained, without much difficulty, our supplies of grain. These were loaded chiefly upon a donkey caravan which was to go up to the top of the plateau, thus relieving our own sixteen ponies from a large part of their burden while climbing the terrible path by which alone one can ascend to the great plateau above. We also engaged, without difficulty, eight or ten assistant caravan men to help our five regular servants who had been engaged in Yarkand, the duty of these assistants being as head-and-tail men for our ponies. A guide (so called) was also forthcoming; not that any one could carry us far on the journey we expected to make (which was across an unknown country and an uninhabited land), but that he undertook to place us three or four days' march on top of the plateau, where we hoped to identify our position by the scant material afforded in ex-

isting maps. At the end of the four days' terrific struggle we had reached the first goal of our ambition—the great upland. The donkey caravan had not appeared at all, and the eight assistant men had quietly dropped out of the way a day's march ahead of our arrival at the top, thus putting an almost impossible burden upon our five faithful men. We sent back for the donkey caravan, which was never seen. A portion of the grain was found thrown on the side of the trail and a sheep which we had bought was found killed. Our men brought back the grain which they found and we had to determine whether we could start out with our reduced supply, for the nearest point (Rudok) was yet twenty days' march away. At Rudok I had hoped, if we were forced to reach it, to get out of the way of the Tibetans and possibly to make some distance further east, although at no time did I feel it possible to reach Lhasa itself, whose closed gates could be opened only by force or fraud. Our caravan-bashi (leading man), a most excellent fellow, thought he could pull the caravan through to Rudok, although the horses must suffer; so off we started. The surly guide seemed to be ill, but he may have deceived us. After two or three days he slipped the bonds which tied him to one of our men at night and disappeared. This attachment to Mir Mullah, a faithful Afghan, was of course a forced one on the part of the guide. It was due to experiences in Africa, and in other unexplored countries, where the natives wisely refuse to accompany white men into lands where they are not wanted. It was, once more, a very grave matter for us to determine whether we should return or try to press on. The thought of the frightful descent of the mountain, the feeling that probably we should never fare better than we had fared at the hands of the Polu authorities, and a general desire not to give in without a fight, decided us in the end to push on. Those were weary days that followed; there was the long search for water, the deceit of the mirage, and after ten or fifteen days the failure of the ponies to bear the rigours to which they were exposed; temperatures of about 25 degrees Fahrenheit below zero at night, borne wholly without protection, and the long day's work under load with a ration constantly diminished as we saw that we were not finding a trail, caused the poor beasts, one by one, to drop by the wayside. We managed to keep going ourselves in pretty good health, although my European companion was badly affected by the extreme altitude which is maintained at substantially 16,000 feet, with occasional rise to 17,000 and 18,000 feet, over so many hundreds of miles of this vast and desolate land. Fuel was supplied by scanty grass roots, or the dung of wild yak, which here and there find herbage in the folds

of the mountains. There was, of course, never enough for heating our bodies, but, very frequently, we were successful in getting a supply to make hot tea, through which alone we were kept alive. The men had for food simply the tea and their bread. We had our bread and tea, and, besides, a supply of Russian canned goods, ungrateful to the taste, but satisfactory as sustenance. The excessive cold made sleep difficult, yet, altogether, the conditions were not such as to militate severely against health. Illness came to Captain Anginieur through his inability to breathe without opening the mouth in these thin airs; that caused fever, and for a time I feared that my poor skill would be wholly ineffective to deal with his malady. However, one way or another, we came finally to a point in a maze of mountains, where it was evident that we must change the ordinary routine, or at once give up any hope of coming out. We, therefore, abandoned a considerable part of our luggage and stopped feeding such horses as were thus relieved. Four or five days of this brought us eventually to a standstill, due to the fact that we had, at an elevation of 18,500 feet, found ourselves unable to see any way ahead that did not involve such terrific climbing of mountains as would undoubtedly within two or three days bring us all to death. Two bushels of grain remained and eight horses out of sixteen. We then retreated down a valley which we had ascended in the hope of finding some way out of the trouble, stopped at a place where water was abundant and where some grass offered itself, and sent out two of our men with the last two ponies which could bear burdens and the last bushel of grain. If they could find succour we were saved; if not, nothing remained except to die. We had food for the five of us in camp for something like fifteen days. At that time we had seen no human being for a period of about twenty-five days. In nearly every direction it was evidently impossible that any headway should be made. Our two trusty envoys had the good sense to follow down a valley in which we had travelled for some days, and we were left to chew the cud of patience as best we could. These men had thought they recognized some landmarks, as both of them had accompanied earlier travellers going out from Western Tibet, and they believed that we were within three or four days of some sort of habitation, and that they would, therefore, undoubtedly return in five or six days at the most. The event proved that we were all very badly out of our reckoning, for day after day passed, and when the tenth day came, upon which we had agreed that if they found no help they should nevertheless return, our hearts sank slowly. The case was particularly trying on Anginieur, who was stricken

with phlebitis—unable to walk more than fifty feet at a time. The eleventh day came and we had determined to stay a few days longer and then resort to eating the horses, several of which had thoughtfully died, in order to prolong still further the possibility of rescue. Our proper food was diminished in quantity so that we then, in addition to a small bread supply, had between us one box of sardines for breakfast and one for dinner. Secure under an armour of thick ice there swam a few fish, which we finally endeavored to trap. Quite without hope of doing any damage to these creatures and only to pass the weary hours, on the 11th day I took a gun and fired idly at them. In a minute came what at first might have been taken as an echo of the shot fired, but when repeated, it could mean but one thing—that our men were returning. Then there followed half an hour of doubt as to whether they came empty-handed and impotent to relieve us, or whether they might indeed have found succor. When, in the distance, we saw two figures briskly trotting up the bleak valley our hearts bounded, for it meant that those two ponies could not be the same which had gone away on one bushel of grain. New ponies meant men, and men meant safety. Ere long it was all cleared up. Our faithful Mohammed Joo and Lasso returned and at their heels a little relief caravan of Kirghiz, the only human beings doubtless within two or three hundred miles in any direction; and by something better than chance—by the common sense of our men—these had been found; since the valley had been followed for 125 miles, barren and dreadful as it was, until it yielded what we above all things desired—a human habitation. Three Kirghiz tents had been discovered. They could give no help at once, because their men were absent, but two days further on Mohammed Joo found the head man of the settlement, a relief caravan was hastily organized, and then at the end of eleven days of suspense these good people came to save our lives. After the relief, all distinctions for a time between sahib and servant disappearing in the general joy, came the question as to whether we could resume our march eastward and southward. The Kirghiz were firm against it; their meagre supplies made it impossible that they should do more than take us back to their own tents; and, moreover, they were as ignorant as we of the uninhabited and impassable country which lay south and east of us. Glad to be relieved from death, but sorely disappointed at the necessity of turning back, we began our march to the Kirghiz tents. Anginieur was trussed up on a horse, and, to our delight, it was found that he could bear the saddle without much pain. Gradually his ability to use his leg increased, and at the end

of a week or ten days he could walk fairly well. There stretched before us twenty odd days of hard march before we could reach a village, and in these twenty days we passed only the three huts of the Kirghiz, who had relieved us, and one other. We were taken over the world-old Karakorum route, which joins Yarkand in the lower desert with Leh in the Ladakh country. Mountain passes, several of which were 18,000 feet high, marvellous peaks towering far above them, great glaciers occupying them, steep descents flanking them—every condition which, by European engineers, would be declared to constitute an impracticable route is found on this caravan trail over which during 2,000 years or more the patient Asiatic has won his way for commerce, for religion, now and then for war. Between two of these great passes, Saser and Kardong, there is found the Nubra Valley. Here, Lamaism, protected by Saser's snows on the one hand and Kardong's glassy slopes on the other, continues to turn its prayer-wheels, wave its myriad supplicating flags to the passing breeze, to sound its deep-toned prayer drums, to build prayer monuments more numerous than the very men themselves, and to lead a quiet life unknowing of all the busy world to which we belong. Tibet is made up of such valleys, but they are not to retain their peace.

As a geographical result of our journey, we were able to place two considerable lakes on the map heretofore blank, and to determine the head waters of the Karakash, a great river which flows down into Chinese Turkestan and becomes a part of the Tarim River system. The general character of the Aksaï Chin, or White Desert, whose unknown sands we thus traversed, is also determined, and particularly were we able to correct the surmises as to the direction of the mountains. Instead of finding them across this desert north and south as heretofore indicated, we travelled constantly between two roughly parallel ranges stretching east and west. While we were thus unable to reach far into the mysterious land which had beckoned us on, we were able to make this small contribution to the map maker's store.

Among the social institutions which have particularly attracted men's thoughts to Tibet is the strange marriage custom known as polyandry—one wife having several husbands, thus sharply distinguishing this custom from polygamy, so widely spread over Asia, including even Tibet. When brought face to face with these social institutions, so different from our own, many thoughtless people dispose of the whole matter by a general condemnation. As a matter of fact, the marriage institution, like all other important

social developments, is founded largely upon the relation of man to the soil. This relation is the fundamental one of all. Carried, as we are by the development of art in a favoured country, far beyond any ordinary consideration of the brutal problem of how to get something to eat, we are apt to lose sight of the fact that this is indeed the radical question which the race must meet, and all social institutions will yield to it, for they must. In Tibet the amount of arable land is exceedingly small, nor is this small area generally arable by nature. The people who are not nomads are those who have been able to build up on the Himalaya slopes a little battlemented field, held in place by stone fences and irrigated by a ditch from some rapid mountain stream. Placed, as they are, at the world's summit, none of them living at an elevation less than 10,000 feet, all of them between this elevation and say 14,000 feet, beyond which fixed habitations seem to be impossible, these people are situated as though their meagre land were the whole world. There is no elbow-room—substantially, they are locked in a snow-prison. For centuries they have struggled with Nature in her most rigorous mood. Now, when a family generations and generations ago was able to obtain possession of a certain amount of reclaimed mountain side, it became highly important that this should not be subdivided and that the number of people depending upon the scanty field for subsistence should not increase. The Malthusian doctrine, obscured as it is is in the land of plenty, here works promptly to a conclusion in the establishment of a very special marriage relation, as found, indeed, in other parts of the world, in sporadic fashion, but never so completely marking a large organization as here; and this unique institution is founded upon the very unique conditions which I have just described. Let us say that three brothers are born into a family. The patrimony must be kept intact, not merely because it is already laid out in certain special rock-ribbed fields, which are not themselves easily susceptible of division, but because in a system of irrigation the relation of a given amount of property to the ditches must be maintained and it becomes substantially impossible to subdivide in the way offered in open countries, such as those with which we are familiar. The elder brother then selects a wife. She becomes the wife of the family of sons who have inherited their patrimony. In this there will be nothing shocking if we are accustomed to it. The one woman, of course, will not bear more children than one woman can bear. There is, consequently, a very serious check upon the population, which check is of the utmost importance, if the race is to be maintained in any sort of hardi-

ness. If a low birth rate is not in some way secured then must follow a very large mortality among children, if they are born out of proportion to the possibilities of sustenance. The surplus of women produced by such a system is, in part, taken up by the large nunneries which the Lama religion has taken from Buddhism, of which Lamaism is but a somewhat degraded form. The doctrine insists upon an asceticism which Europe has quite outgrown, and which probably in no country in the world can be found of long duration unless, as in Tibet, the conditions are such as to make impossible a large increase of population. There is also in Tibet a very large withdrawal of men to the monastic life; hence the number of births is held within such limits as permits the society to maintain itself substantially at a fixed level, save when disturbed, as it has been, by wars. Such fluctuations, as is well known, when due to violence, are gradually corrected and the original level is restored. With polyandry and polygamy, as with any other important institution, the relations to other conditions controlling the society must be carefully studied, not only before we blame, but before we determine that this or that social institution is not indeed well fitted to the other relations which the society must sustain. Perhaps the one respect in which those who travel among primitive peoples may be found to differ most markedly from those who do not is in their larger sympathy and charity for variations from our assumed normals.

The introduction of our arts, which it seems we shall force upon the Tibetans, may render unnecessary the maintenance of a system which is repugnant to our habitual conceptions in regard to marriage.

To illustrate further the connection of this system with property relations, it should be added that when a man establishes himself independently of his brothers in some new holding, he is quite free to break away from the family marriage and take a wife of his own. Polygamy is also found when occasional wealth prevails. It has been thought, in addition to the powerful causes operating out of the land system, that in the earlier days of Tibet before villages were scattered over its area many women were, necessarily, left alone if they had but one husband, since agriculture, and particularly grazing, was carried on at considerable distances from the home, and it is probable that the security offered by the assured presence of a man in the house to protect the woman, helped to strengthen the polyandric custom when it was a young and growing one. That these long and periodic absences of men who inhabit such countries and who must undertake even the peaceful pursuit of agriculture in a sort of warlike fashion, had, indeed, great effect upon the social

arrangements, is beyond doubt; and we may, therefore, consider that all these forces have co-operated to produce the existing institution of polyandry.

To summarize: the poverty of the land making it impossible that population should rapidly increase, the relative indivisibility of the land constituting a patrimony, and the enforced absence of the husband exposing the wife to danger,—these are the three elements which probably have set up the institution of polyandry. It is fair to add to the statement of the case that women have, perhaps by virtue of this institution, always played a large part in the family and even the national life of the Tibetans; the individual woman is as free as she is in our own countries, and, so far as observation can go, is as self-respecting and as much respected as the women in our own country.

With regard to the exclusion of Europeans, we are to remember that, as early as 1325, European travellers passed through Tibet, and that a number of them have remained for long periods at the very capital so recently considered as the inaccessible Lhasa. Christian missions were in Lhasa; from 1716 to 1729, under one leadership, and another from 1719 to 1735. An English traveller visited Lhasa in 1811; and in 1845 Père Huc reached Lhasa, and at the end of two or three months was sent away by the Chinese officials there residing; for China has, for many centuries, exercised a suzerainty over the Tibetan country, sometimes rudely shaken by disorders within China, but always renewed when some strong hand had grasped the sceptre of the "Elder Brother," as the Chinese Emperor is called throughout eastern Asia. Other portions of Tibet than Lhasa itself have been visited by some Europeans who did not reach the capital, and all these early missionaries down to and including Father Huc report the most courteous treatment accorded them by the Tibetans, and particularly Father Huc insisted that the Chinese officials, and not the Tibetans, demanded his exile. Why should this be? It chanced that the Chinese delegate to Tibet in 1843 was one Kee Shen, who only three years before had been forced to humiliate himself and his country by signing a treaty forced upon China by the British. Long before the Opium War 1842, the progress of events in India had made the Chinese understand how fearful to them are the results of contact with the people of fire and iron. The contest about the opium trade itself had begun as early as 1790. In addition to that, Tibetan territory had been violated in 1792 by the Gurkhas, who had recently conquered Nepal, subduing the original natives, who are similar to the Tibetans in race, and with affinities in religious

matters. The Chinese believed, that the attack of the Gurkhas must have been countenanced, at least, by the British, since at the time of the attack the British were on friendly terms with these Gurkhas, having recently made a commercial treaty with them; and when a Chinese army, venturing over the dreadful fastnesses of Tibet, had beaten the Gurkha people on Nepal territory and forced them to sue for peace, they found a British officer who had come up at the request of the Gurkhas to aid them in their task of resisting the Chinese. In 1845, also, substantially at the time of the Father Huc episode, Tibet was again attacked from the west through the Ladakh country by the Maharajah of Kashmir, who still holds Ladakh, this Maharajah having been set on his throne by the British after the destruction of the Sikh power in the Punjab. The Maharajah, in other words, was an ally of the British—a protected ally; and it is the peculiar claim of the protecting Powers always that they control the external relations of their wards. Could the Chinese fail to imagine that this also was an attack known to the British as being made against the Tibetans and substantially against themselves? Again, in 1854 the Gurkhas from Nepal renewed the attack upon Tibetan territory; and this time more successfully, because China was again in the toils with the European Powers, being punished by France and England combined for some of her supposed offenses, none of which has ever involved anything but a desire to keep her household as she chooses to keep it. The Tibetans have had time by these experiences and their more complete knowledge of the troubles which China has had to understand as they never understood before the extreme danger of contact with the white man.

A few years ago, in the '80's, Great Britain practically forced upon the Tibetans a treaty for the establishment of a little trading post on Tibetan territory, north of Bhutan. The Bhutanese had for generations been on good terms with the Tibetans, but had been forced to accept a British protectorate, though holding out against the incoming of white men (except the Resident), as, indeed, do the Nepalese. The Bhutanese, the people of the small territory of Sikkim, may be now recognized substantially as the tools of the British Government. Then there came a time when the Dalai Lama varied from his traditional policy of non-intercourse with outside people, only to this fatal but innocent extent,—that is, he sent presents to the Czar through a certain Buriat from the Lake Baikal region in Russia. These Buriats are sheep in the spiritual fold of the Dalai Lama. They have been admitted, together with certain

Kalmucks from the lower Volga, while other outside people, including Asiatics generally, were not admitted, and this by reason of their spiritual relations. This particular Buriat had received, unhappily for Tibet, a European education in a Government Institution, and was therefore much Russified. He desired, very naturally and properly, to enlarge his own career, and by means not now known was able to convince the Dalai Lama that it would be good for himself and his fellow Buriats that their great master in St. Petersburg should be complimented by their spiritual lord in Lhasa. Out of the sending of these presents came the Younghusband expedition. The real matter in question was that Great Britain intended to make it clear that she, and not Russia, should control in Tibet.

As to the future, it is to be considered that if the British supremacy over Tibet is established, it may be followed by the probable taking of Chinese Turkestan by Russia. In the system of balances which the great civilized and nominally Christian nations have adopted among themselves in their dealings with weaker people, it is well understood that the seizure of territory by A shall be followed by some seizure by B, if A and B chance to be rivals in the same field. The ability of the Russians to take Turkestan can in no way be doubted. It has been perceived for the last fifteen or twenty years that it was a happening which might at any time be looked for; and, indeed, the probability of that seizure is, after all, perhaps, Lord Curzon's best excuse for balancing the Central Asian influence; only he has taken time by the forelock and seized Tibet before Russia has seized Turkestan. However that cycle may be completed, suppose Tibet in the hands of England, and Chinese Turkestan in the hands of Russia. We have then a new situation in Central Asia—a new situation in the East generally in this, that these two great jealous rivals find themselves side by side at the back door of China. It is not necessary that either should have a set plan for aggression against Chinese territory in order that such aggression may take place. The same sort of craving for prestige which has urged Great Britain to extend her efforts now even beyond the Himalayas, will continue to urge her onward. Petty disputes become reasons for seizing first this, then that, and the other territory in the border land between China proper and Tibet. Such incidents having taken place there, as they inevitably will hereafter, it may be promptly assumed that Russia will find some cause for complaint along the Mongolian Turkestan border, then on the Mongolian Chinese border, so that we shall have before us the probability of a hidden attack upon the integrity of China at its back door in regions rarely visited

by Europeans, and where much may be accomplished in the way of undermining the prestige of China (so essential to its hold over the interior) without the knowledge of others than the principals,—that is, Russia and England and China.

EARLY WESTERN EXPLORERS AND THE RAILROADS.

BY

HENRY GANNETT.

Between the time of the Lewis and Clark Expedition, near the beginning of last century, and 1870, scores of exploring expeditions traversed the West in all directions. These expeditions were in nearly all cases under the War Department, and were headed by army officers. They made route surveys, by means of traverse lines, mapping by distances and directions the route traversed. A narrow ribbon of country was mapped, which differed in breadth with the character of the country, being broad upon the plains and in the valleys, but narrow in the mountainous regions. These surveys were brought together into a map which was the first to portray, upon any considerable scale and with any pretence to accuracy, the geographical features of the great West.

Among these numerous expeditions a large number were carried out in the late forties and early fifties for the express purpose of discovering feasible routes for railroads connecting the Mississippi Valley with the Pacific coast. These were known as the Pacific Railroad expeditions, and the results were published in a series of quarto volumes.

It has been questioned whether these Pacific Railroad explorations and other Western expeditions suggested the location of the existing railroad systems of the West. To test this matter I have placed upon a modern map of the western part of the country the routes of these expeditions, so that they came in juxtaposition with the existing railroad systems, and have measured on the one hand the mileage of existing roads which follow the routes of exploration and on the other hand those which do not.

It appears that in the Rocky Mountains and Pacific Coast States—that is, those lying west of the eastern boundary of Montana, Wyoming, Colorado and New Mexico—about half the mileage of rail-

roads follows the routes of explorations. I do not mean by this that the railroads follow these routes in all details, but that the same gaps, passes, etc., are utilized, while in the broad valleys the railroad route may differ several miles from the exploration route, although the line of the valley is followed.

When one considers the great trans-continental lines, however, for whose location these explorations were specifically made, it is seen that the routes of exploration are followed in far greater measure. Thus the Atchison, Topeka, and Santa Fé Railway from the east line of Colorado to San Francisco follows the routes of early explorers for more than six-sevenths of the distance. From the east line of Colorado to La Junta the line follows the Arkansas River in the steps of numerous explorers. From La Junta to Trinidad, Abert and Peck had blazed the way. From Trinidad to Albuquerque the railway follows the route of Capt. Emory, and from Albuquerque to The Needles, on the Colorado River, the route had been explored by Simpson, Whipple, Beale, and Ives. The railroad crosses the Mojave Desert from The Needles to Mohave independently of the route of any explorer, but from Mohave to San Francisco over the Tehachapi Pass and through the San Joaquin Valley it follows Fremont and Williamson.

The Southern Pacific Railway from El Paso to San Francisco follows explorers' routes over about six-sevenths of the distance. The first part is independent of explorers, but in western New Mexico it adopts the route explored by Lieut. Parke and thence to Yuma follows the route of this officer, Capt. Emory, and Lieut. Cooke. It takes up the route of Lieut. Parke at Indio, and follows it by way of Los Angeles and the coast line to San José.

The line of the Southern Pacific Railway from Benicia, Cal., to Portland, Ore., follows almost entirely the route of Williamson and Abbot, the only departure being for a short distance in northern California.

Of the line of the Union and Central Pacific Railroads between the east boundary of Wyoming and Sacramento, Cal., fully five-sixths was pointed out by early explorers. Stansbury traversed this route from the neighbourhood of Cheyenne to Granger, Wy., Beckwith from Evanston to Ogden, through Echo and Weber Cañons. The route down the Humboldt River and over the Sierra Nevada to Sacramento was first pointed out by Fremont.

Of the route of the Denver and Rio Grande Railroad from Denver to Salt Lake very nearly two-thirds was laid out by these early expeditions. Fremont traversed it from Denver to Canyon City,

and from Buena Vista up the Arkansas through Tennessee Pass and down the Eagle. From Grand Junction to Price, Utah, it was traversed by Gunnison, and from Thistle Junction to Salt Lake by Fremont and Beckwith.

Two-thirds of the route of the Oregon Short Line and Oregon Railroad and Navigation Co., stretching from Granger, Wy., to Portland, Ore., was traversed by these expeditions. Bonneville went over the part between Granger and Soda Springs, Idaho; while Fremont and others traversed the route from Boise to Portland.

Of the route of the Northern Pacific Railroad, from the east boundary of Montana to Tacoma, Washington, three-fourths was mapped by these expeditions. The long stretch from Glendive in eastern Montana to Lake Pend Oreille, Idaho, was traversed by Lewis and Clark, Reynolds, Warren, and Mullen. From the latter point to Pasco the railroad was located on a route not traversed by any explorer, but from Pasco to Tacoma, with one or two trifling breaks, the route was followed by Mullen.

The Great Northern Railway, the latest of these trans-continental lines, discovered its own route for two-thirds of its way, only one-third being suggested by early expeditions. Mullen traversed its route from Williston, on the east boundary of Montana, to Havre and also across the Mission Range, the easternmost of the Rocky Mountains in this latitude.

ANTARCTIC NOMENCLATURE.

BY

EDWIN SWIFT BALCH.

Dr. Hugh Robert Mill recently made a suggestion in the *Geographical Journal* (July, 1905, Vol. XXVI, page 79) which deserves the consideration of other geographers. He says:

> The map of the great peninsula of Antarctic land has been enriched by several new names, but several changes of names are also shown, which we consider ought to be arranged, when necessary, by some international body, such as the International Geographical Congress, because it is very awkward to have different names in different works of reference, and there is at present no authority to turn to when a doubtful point of nomenclature has to be settled.

The need of some fairness and impartiality in connection with Antarctic geography and nomenclature will be apparent to any geographer who turns to pages 17-27 of the July number, also, of the *Geographical Journal* for 1905, and who reads the extraordinary statements and opinions published in the retiring address of the

Ex-President of the Royal Geographical Society, Sir Clements R. Markham.

Sir Clements R. Markham, for many years past, has shown the most uncompromising hostility to American Antarctic explorers, he has repeatedly misrepresented them, and he has so little hesitated in suppressing the truth about them that in articles devoted to Antarctic geography, published a few years since*, he omitted entirely any reference to the governmental United States Exploring Expedition. And yet, to the commander of that expedition, Lieutenant Charles Wilkes, U. S. N., for his services to geography, the Royal Geographical Society itself gave its own gold medal.

In his retiring address, Sir Clements R. Markham has, if anything, surpassed his previous efforts; and as an example of his method of dealing with geographical facts, and also as an example of his feeling towards Americans, the following specimen will suffice. He says (page 21):

> The distant land was named *Adélie* and the ice cliffs *Côte Clarie.* Wilkes appears to have sighted *Adélie* and *Côte Clarie*, previously discovered by Dumont d'Urville, between January 30 and February 7, 1840.

Sir Clements R. Markham knows perfectly well that there is no "appears" about it. "Appears" is a deliberate attempt to cast a slur on the American explorers. Any one who compares the maps of Dumont d'Urville and Wilkes will be instantly convinced not only that Wilkes sighted the same coast as d'Urville, but that he saw a great deal more of it, because, as his track shows, Wilkes hugged the coast east of Adélie Land, whilst d'Urville went or was driven out to sea. Moreover, Wilkes thought he saw high land, which he called Cape Carr, back of the ice cliffs of Côte Clarie, and this fact Sir Clements R. Markham deliberately suppresses.

Sir Clements R. Markham has also now reached a mental stage in which he proposes to re-christen the entire Antarctic region with British names. He says (page 20):

> For convenience in describing the several parts of the vast region, it is divided into four quadrants—
> I. The Victoria Quadrant, 90° E. to 180° E.
> II. The Enderby Quadrant, 90° E. to the meridian of Greenwich.
> III. The Ross Quadrant, 180° to 90° W.
> IV. The Weddell Quadrant, 90° W. to the meridian of Greenwich.

And further (page 26) Sir Clements R. Markham says:

> The Antarctic area would thus consist of two continental land-masses of unequal size, Queen Victoria Land and King Edward VII. Land, separated by this marvellous barrier; and of two seas extending far to the south, the Ross sea and the Weddell sea.

It may be questioned whether, in all the annals of geographical literature, any such astounding assumptions can be found. One

* Encyclopædia Britannica, Ninth Edition: *art.* Geography, and *Geog. Journal*, Vol. XIV, No. 5.

could readily imagine an Abyssinian dividing the Antarctic into King Theodoros Land and King Menelik Land, and a Zulu dividing it into King Chaka Land and King Mosilikatse Land, but any attempt on the part of an American or of a continental European geographer to introduce such nationally self-glorifying names would certainly and justly be looked on as the whim of an insane person.

To return now to Dr. Mill's pertinent and sensible suggestion, it would seem well that geographers should consider before the next meeting of the International Geographical Congress whether a Committee on South Polar Names should or should not be appointed. If fair and impartial persons were chosen—for instance, Dr. Nordenskjöld for Sweden, Captain de Gerlache for Belgium, Dr. Wichmann for Germany, Dr Mill himself for England, and other geographers of their calibre for their respective countries—it is probable that, if time enough were given to the matter, such a committee might help to clear up Antarctic nomenclature.

Perhaps, however, it would be best simply to let time and future work gradually sift out the proper and correct names. There does not seem to be any desire among the geographers of the mainland of Europe, nor among those of America, to be anything but fair towards the explorers of all nationalities, and in all probability such names as King Oscar Land, the Powell Islands, Cape Carr, and Palmer Land will gradually take their rightful place on Antarctic maps. It seems, perhaps, as if letting things fix themselves might on the whole be wiser than putting the matter into the hands of any body of men, who, at the best, could only arrange in a hurry, and possibly by a series of compromises, the somewhat intricate subject of Antarctic nomenclature.

CULTIVATED RUBBER.

BY

JOHN C. HORTER.*

So peculiarly misinformed is the world at large on the general subject of India-rubber that it would seem that those even curiously inclined, or for any reason interested, have been satisfied with the

---

* Mr. Horter is the manager of a rubber-planting company in Nicaragua. The BULLETIN has already printed facts concerning the cultivation of rubber in the Malay Peninsula, and Mr. Horter permits the publication here of some extracts from an unpublished paper by him on the same industry in Nicaragua.—(EDITOR.)

impression they early acquired in the pages of "The Swiss Family Robinson" that rubber in strips is obtained from cracks in the bark of trees found in the woods.

Of the status of cultivated rubber the knowledge is even less; but this is more reasonable, since there has been hitherto practically no real information to disseminate; half the world, with an unexplained prejudice, asserting that planted trees yield no product, or at best succumb to repeated tapping, and are a flat failure, while the other half, who have really read extracts from reports which apparently tend to such evidence, vehemently claim that cultivated trees when seven years old, and from then on in an increasing ratio, give from two to six pounds of rubber per year.

A subject which has been so mistreated may be illumined by a statement of the first practical experience in tapping many thousands of cultivated trees, not only once, but twice at intervals of three or four months; and watching the effect of the knife on them. In the belief that the world is interested, the tale told by these trees is here set forth.

That the yield of planted trees is disappointing, at least when compared with expectations, this experience will unfortunately show. But it is not to be inferred that the cultivated tree yields less than the wild tree of the same age. The exaggerated hope for the cultivated tree has grown out of ignorance of the actual age of the wild tree, of which there plainly could be no data. The size of the wild tree as compared with the planted tree gives no hint of its years, for its growth in the shade is much slower than that of the sun-grown cultivated tree.

In the district under consideration, which is thirty miles from Bluefields and near Pearl Lagoon, the oldest rubber plantation was planted with seed of the "Castilloa Elastica" species in 1897. On this plantation in May, 1904, were tapped 6,000 trees, and an average of one and one-third ounces of dry rubber was obtained from each tree. The total product was shipped from Bluefields in June, 1904. The product of the second tapping of the same trees left Bluefields on Dec. 14.

These are the only considerable shipments from cultivated trees from Nicaragua, and, if there has been any wholesale tapping elsewhere, or anything more than in an experimental way, the fact has not been made public.

The neighbours were aghast at the small showing, and ascribed it either to the wrong season of the year, or to an inadequate number of incisions, or to the instruments employed. After waiting for

months, in order to note the effect of the first tapping on the trees, and finding none in any way impaired, the second bleeding was commenced. The same 6,000 were cut, and a few thousand more, resulting in an average yield from each of one and eleven-sixteenths ounces.

Intrinsically, the quality of cultivated rubber is precisely the same as that taken from wild trees, since both are of the species "Castilloa Elastica," which is found in the forests of all the Central American countries. Commercially, however, the product of the planted tree is likely always to be more valuable because of the greater care in gathering it. In the forest a tree of the size of those tapped on the plantation is much older, and therefore gives much more milk. This milk is not only permitted to find its way to the base, but is guided there, where it mingles with the dirt and spreads itself into a cake, or what is called *cuero* or *tortilla.* No effort is made to keep it clean; on the contrary, the added weight of the adhering dirt is aimed at. If the expectation of the yield is disappointing, it is in a measure a compensation to know of the vitality of the planted and cared-for *Castilloa Elastica.*

During the first tapping an incompetent chopper entirely girdled twenty-three rubber trees before he was discovered and stopped. They healed the same as the remainder, and were bled along with them at the second milking, giving the same quantity of rubber as the other trees.

As long as the sap is not cut into or girdled, the outside layers of the bark of the rubber tree may be cut clean around, or, in fact, removed from any considerable space with impunity. We have, in fact, seen as much as two feet peeled off. The bark alone contains the milk—the product—and in no way affects the life of the tree.

The majority of planted trees are cultivated in the sun, and the great tenacity of life which they show is owing to the influence of sunlight, which helps the tree to resist the encroachment of disease or any attack on it. Hence the incisions made with the knife on the planted tree heal very much more rapidly than on the wild tree, which is always in the deep shade.

The wild tree when tapped is ascended by means of the same spur that is used by the telegraph-pole climber. These spurs penetrate the bark. In the holes thus made is deposited a worm, which eats through the trees and causes its destruction. It also attacks the planted tree; but, as already explained, the influence of the sun which the wild tree lacks soon nullifies its work.

There are very few, if any, large trees remaining in the forest,

and one that gives as much as five or six pounds of dry rubber at a tapping is a rarity. Stories of 100 pounds to a tree are still told by old gatherers, but there are no means of confirming such stories now. The native never keeps a record of anything, and can seldom give the date of his own birth, or of any other event. The opinion, then, of these people, if asked as to what a certain tree will yield, is of no value, but it is probably responsible for the exaggerated hopes that have been entertained by the outside world.

Some of the earlier plantings here were from seed sown in nurseries and, after about a year, transplanted to the land cleared and prepared for them. More recent plantings, however, are from the seed, about five being put in a hill, where the fittest only is allowed to survive. Most of the plantations have their trees ten feet apart, some no more than seven; our own are fifteen. The open sunlight has been given in almost every instance after the trees were removed from the nurseries until they were three years old.

Why there should be any unreasoning disbelief in the successful cultivation of rubber it is difficult to understand; for was there ever yet a tree, bush, or vine growing spontaneously in the earth that was not bettered by man's care and cultivation? In Nicaragua, where the wild rubber tree is called "God's tree," it does not seem unreasonable to expect it to grow, to flourish, and to yield. If disappointment now seems to attend these efforts and the reward appears inadequate, it may only be because hope was set too high; and had expenditures been originally made with more reasonable expectation, the results as they are now disclosed would not present a wholly discouraging view.

A word about stock companies formed to plant rubber. United States Consuls at many stations, on hearsay evidence only, and with out any knowledge whatever of their own, were responsible, when these companies were formed, for the exaggerated hopes of many investors.

It was very reasonable on the part of the originators of these companies to promise a return which their own investigations had led them honestly to expect; and, if the results only just now disclose error, it by no means follows that there was originally any intention to deceive. It was and is a mistake for a poor man to invest in planting rubber, the returns from which cannot be looked for short of several years. Investors were invited into these companies on some sort of a monthly instalment plan, and, growing tired (just as that class of investors usually do) and defaulting on their promises, probably caused the failure of the companies for want of funds.

The rich man alone can afford to plant rubber. Certainly, some one must do it, and at once, if the world is to be supplied. With the full yield from every tree now in cultivation, there will not be enough from such a source, with the wild tree out, to supply one large city. For the rich man who wants a safe investment paying a fair rate of interest there could be no better opportunity than to plant rubber.

This incontrovertible fact stands out; it costs $1 (and in many cases much more) to bring the cultivated tree to its seventh year. The tree then gives but four and one-sixteenth ounces of rubber; after deducting the cost of gathering the rubber and caring for the plantation and after the seven years of waiting the return only then begins to be 6 per cent. on the investment.

THE PARTITION OF SAKHALIN.

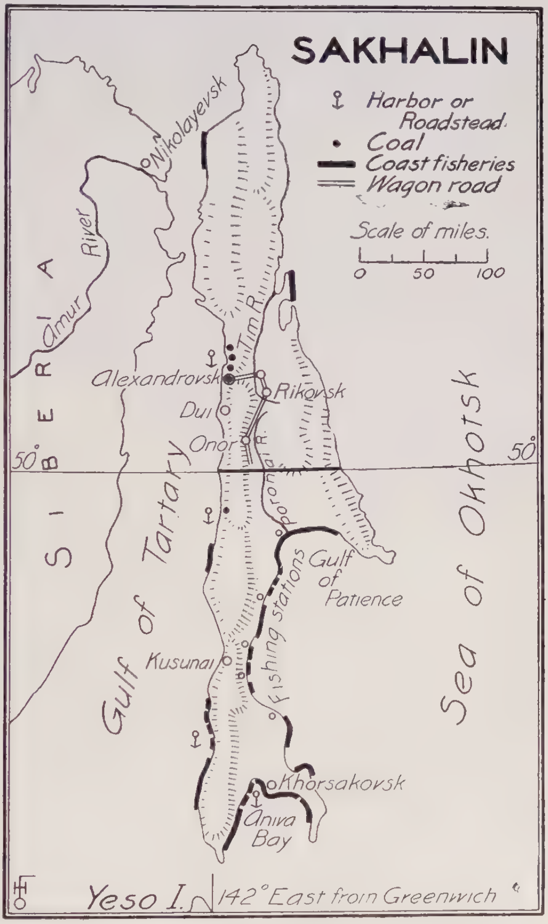
One of the results of the Treaty of Peace between Japan and Russia was the partition of Sakhalin, so that the southern part of the island has come into the possession of Japan. Our map shows the boundary between the Japanese and Russian territories. It is a line coinciding with the Fiftieth parallel of north latitude. As the northern or Russian part of Sakhalin is wider than the southern part, Russia retains more than one-half of the area, and, as far as is yet known, the larger area of coal fields, which thus far appear to be the most important source of mineral wealth.

Japan's territory, on the other hand, being farther south, is somewhat superior in climatic conditions, and therefore in agricultural prospects. There is little opportunity, however, for very important farming development, as the growing season is too short, even in the south, to mature cereals, though large quantities of other vegetable food may be raised.

The great attraction of the island for the Japanese was the fishing-banks along parts of the coasts, which are rich in fish food, and may be developed into fisheries of very large importance. Our map shows the portions of the coast-line where these fisheries are of most value; and it will be observed that the most extensive of the fishing-grounds have come into possession of the Japanese. Another source of wealth by which the Japanese will profit is the fur animals, and especially the sable. As yet the forests of Sakhalin have been little hunted for them, though the leading fur animals of Siberia

abound there. Before the treaty of peace was signed the Japanese, between July 7 and 12 last, landed troops in sufficient number to take effective possession of the entire southern coast.

In the northwest part of the map is Nicolaievsk, in Siberia, which promises some day to be of considerable importance as the seaport of the Amur River.



Sakhalin lies off the east coast of Siberia between latitudes 45° 54′ and 54° 24′ N. Lat., and is separated from the mainland by the Gulf and Strait of Tartary, the latter being very narrow at about latitude 52° and full of sand banks. It is about 600 miles long and from 16 to 100 miles wide. A mountainous ridge runs along the island for the whole of its length, flanked by low sandstone hills to the east and west but of greater extent on the east. There are two principal rivers, both reaching the sea on the east: the Tim, flowing northward into Nyi Bay to the Okhotsk Sea, and the Poronai, flowing southward into Patience Gulf towards the Pacific.

Mr. L. V. Dalton, who has recently visited the island, writes to the *Asiatic Quarterly Review* that, contrary to the general view, much of the summer weather is the finest that could be wished for,

while the winters, though cold, are dry and healthful, like those of Canada. Three-fourths of the island is covered with dense pine forests. In the north are also the larch and birch, while in the south are the maple, oak, ash, bamboo, corktree, and other sub-tropical trees or shrubs. The fauna includes the bear, fox, sable, wolves, reindeer, and the small striped squirrel of northern India, while in the rivers or along parts of the coast seal, salmon, and more southern fish abound. The spouting of Greenland whales is no uncommon sight on the coast washed by the Okhotsk Sea.

The total number of inhabitants is about 36,000, of whom only 4,000 are natives. Nearly all the present white population consists of convicts and Russian officials and soldiers. The Russians are for the most part confined to two districts—one around Alexandrovsk on the west coast, and the other around Khorsakovsk on Aniva Bay in the extreme south of the island. A few settlements are scattered up and down outside these areas, but the principal prisons are at Alexandrovsk and Khorsakovsk, with a large sub-prison at Rikovsk east of Alexandrovsk.

The native population is composed of about 2,000 Gilyaks, 1,300 Ainus, 750 Orotchons, and 200 Tungus. Scanty though the population is for the size of the island, Sakhalin has no lack of resources, vegetable, animal, and mineral. The coal of the Dui-Alexandrovsk mines has been worked for many years, and gold and other metals occur at many points, though an obstacle in the way of mining is the fact that in the northern forests the soil is frozen below a depth of four feet the year around.

Mr. Dalton expresses the view that the annexation of the southern part of the island by Japan will materially benefit the country, as it means that the convict settlement there will be abolished; and as the convicts have had no interest in promoting the development of the island's resources, Sakhalin has not been helped by their presence.

UNIFORMITY IN MOUNTAIN ELEVATIONS.

BY

PROF. ANGELO HEILPRIN.

In a paper entitled "The Accordance of Summit Levels among Alpine Mountains," and published in the *Journal of Geology* for February-March, 1905, Mr. Reginald A. Daly presents some interesting considerations bearing upon one of the most obscure of geo-

graphical problems, and much side-light (or thought) upon the theory of peneplanation as it is brought in to explain the phenomena which he discusses. It cannot, perhaps, be said that Mr. Daly fully responds to or satisfactorily meets all the problems which he himself propounds, but that he successfully sets to side a theory or doctrine in geology which has become more than popular with the "newer school" of physiographers many will agree.

The facts to which the author refers have long been known to students of mountain-forms, and, perhaps, equally so to the mountaineer, who sees in Nature naught but "the beauties of Nature," and in whose broader contemplation theoretical conceptions have no part. The problem as to why the dominant summits in a given mountain chain or system are so nearly of a uniform height manifestly attaches itself directly to the theory of peneplanation, since it reflects, although in a less trenchant way, the problem of even crest-lines, such as is typified in the long N. E.-S. W. extent of the Appalachian system of mountains. In other words, the lofty mountain summits are residual masses standing out from an eroded and formerly even-topped (or peneplanated) land-surface, and their tip-tops point in a general way to the upper horizon from which they have been cut.

Mr. Daly, in weighing the evidence, finds that the conditions of peneplanation do not satisfy the problem. An important consideration with him in arriving at the conclusion is the necessity for assuming that the condition of peneplanation must have been followed precedent to the new erosion by a warping (with medial upthrust) of the land's surface, so as to bring about that "low arch, highest in the interior of the range and elongated in the direction of the main structural axis of the range" which is thought to mark the "imaginary surface which will include the higher summits of peaks and ridges in an Alpine range."

But one may well pause here and ask: Has the imaginary surface which unites the culminating points of an Alpine chain really this form of an arch? Were the Alps, or the Pyrenees, or the Caucasus alone considered one might be tempted to answer in the affirmative; but when the broader prospect of the nearly 1,500 miles' extent of the Rocky Mountains, between Mount Columbia and the Sierra Blanca, with its hundreds of summits rising to the 12,000-14,000 foot level, is opened up; or the equally long line of the Himalaya-Karakorum system—with its loftiest elevation, Mount Everest (29,002 feet), far toward its eastern part separated by a thousand miles or more from its "second in line," Mount Godwin-Austen (or

Peak K^2, 28,278 feet)—be considered; or the still more formidable chain or cordilleras of the Andes, with summits rising from 19,000 to 22,000 feet distributed irregularly over a course of 3,000 miles or more, it is only with a feeling that the imagination has been geographically stretched that we can consider the theoretical arch to exist. In so far, therefore, an objection to the theory of peneplanation—to the extent, at least, that it necessitates the condition of warping—might be considered removed. Probably a far more serious objection to the theory in this connection is the condition itself that residual fragments of a peneplanated surface should remain of so nearly uniform elevation of whatever physical type the constructing form may be, after erosion had removed (or lowered) the general surface by many thousand feet. The student of geological physics who has not yet been completely won over to the doctrine of peneplanation may, indeed, ask for much stronger evidence than has yet been presented proving the kind and measure of land-wear that is demanded by this theory before he will be willing to relinquish the consideration of other explanations that seem to meet his problems equally well, and he will, perhaps, hardly be on the outside of the science if he still entertains a suspicion that even the lower eroded surface representing the even crest-lines of the Appalachian Mountains need not necessarily be the expression of peneplanation.

Without entering into a further discussion of this theory and of its consequent conditions, or following too closely the speculative views of Mr. Daly, it is interesting to note that our author finds a safer ground in the analysis of his problem in assuming that his isometric summits are such largely (or mainly?) by inheritance (from an "original" top-line of development), or, more exactly, inheritance modified by isostatic adjustments and differential degradation.

In assuming this hypothesis, Mr. Daly relies, perhaps too much, upon the theory (set forth by himself) that a constructional limit to the height of a mountain can be predicated, and that this ultimate height is determined by the resistance of the mass to a crushing strain. In other words, Nature, in making mountains, permits them to rise to a certain elevation and no more, and this farthest elevation will be the even measure whence the departure from inheritance must be calculated. But have we any evidence in fact to support this conclusion? Mr. Daly believes that no mountain is likely to have ever risen to a much greater height than 30,000 feet or to have greatly overtopped Mount Everest. It may be admitted at once that there is no evidence of any kind to support this conclusion,

unless, indeed, one assumes the wholly illogical position that *because* the loftiest summit to-day rises to 29,000 feet it necessarily represents the limits of work in this direction. It might as well have been argued in 1750 that this limit of resistance to crushing strain was the Peak of Teneriffe (then thought to be the highest mountain in the world) and, a quarter of a century later, the Mont Blanc; and still later Chimborazo.

While Mr. Daly's paper deals exclusively with isometry among Alpine summits, and the discussion there given is seemingly made to contour the full problem which it attaches, the fact is that the problem is made much more complex by reason of the condition that accordance in summit elevation (or isometry) is as much a distinctive feature of low mountain chains as of high ones, and in those of antiquity as of new age. One need hardly call to mind (without reference to any theory regarding such formation) the familiar Azoic and, later, Paleozoic stems of the Appalachian system; the 1,500-mile length of Permo-Carboniferous Ural Mountains, with culminating points in the north and in the south of 5,200-5,500 feet; the Jurassic Jura Mountains, and the great Cretaceo-Tertiary involuted Carpathian-Balkan uplift, with its numerous summits of 7,800-8,600 feet elevation scattered over a length of 1,200 miles or more. Other examples of similarly-adjusted mountains could be cited, and a conspicuous reference would be the east-coast mountains of Australia or the Great Dividing Range, with its various ramifications and parallel spurs, in the farther southwest. A most interesting element in the problem under consideration, and one that opens up entirely new vistas in speculation, is the condition that even among *volcanic* mountains of comparatively recent date and where the volcanic form is still retained, there is frequently a marked correspondence in summit-levels for given series. It would be entirely beyond the bounds of this paper to enter into a discussion of this most interesting disposition of Nature's forces, but it may not be amiss to call attention to that remarkable linear group which constitutes the major part of the Lesser Antilles, and gives to the different islands (St. Kitts, Guadeloupe, Dominica, Martinique, St. Lucia, St. Vincent, etc.), stretched out over a length of 600-700 miles or more, the extraordinarily accordant summits of 3,500-4,200 feet elevation.

The problem of mountain reliefs and adjustments does not seem to the writer to lend itself so readily to approach and resolution as many other problems in geology, and a caution for facts in advance of theories could hardly be thought to retard the study of this most fascinating department of terrestrial physics.

MAP OF THE UNITED STATES ON A SCALE OF 1:1,000,000.

The United States Geological Survey has already made large progress under the direction of Mr. Henry Gannett, Geographer of the Survey, in the production of a map of this country on a scale of 1:1,000,000 or 15.8 statute miles to an inch, in accordance with the recommendation of the Eighth International Geographic Congress. This recommendation was as follows:

> The Congress proposes to the Government of the United States the execution of a general map of America on the scale of 1:1,000,000, similar to maps on the same scale of parts of Asia, China, and Africa now in preparation by the Service géographique de l'Armée in Paris, by the Königlich-Preussische Landesaufnahme in Berlin, and by the Intelligence Division of the War Office in London; each sheet of the map being projected separately and being limited by parallels 4° apart and meridians 6° apart; the initial meridian being that of Greenwich, the initial parallel the equator; the standard of measures being the meter.

The information supplied to the Society by Mr. Gannett enables us to show on this map the parts of the country for which maps have thus far been drawn on this scale. The areas thus covered are in black. They embrace the whole of Virginia, West Virginia, Maryland, Delaware, the Indian Territory, Oklahoma, Kansas, Nebraska, New Mexico, Arizona, Colorado, Wyoming, Utah, the western half of South Dakota, and parts of California. The map has been drawn for all these regions and is ready to be engraved.

The sheets for the eastern part of the United States are in progress. A map showing the drainage of this part of the country is being made for Mr. Newell, Chief Hydrographer of the Geological Survey and Chief Engineer of the Reclamation Service. It is being prepared on a scale of 1:1,000,000. Contours of elevations will be placed on these sheets, which will thus be adapted to form a part of the map of the country on this scale.

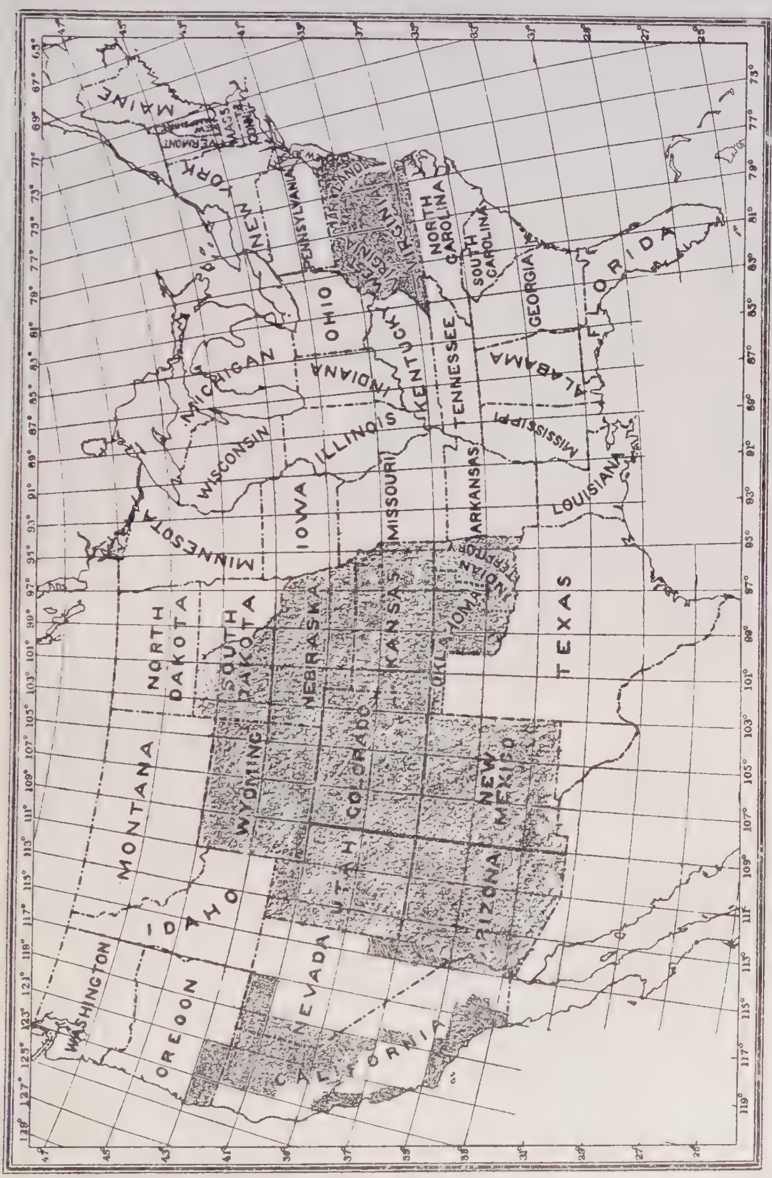
Mr. James White, Geographer of the Canadian Department of the Interior, has charge of the work of producing a map of Canada on the desired scale.

Our Geological Survey has taken steps to interest the countries of South America in this work and induce them to undertake on their own account the preparation of maps of their respective domains on the uniform scale.

Our army service in the Philippines will contribute a map of the archipelago to this general map of the world. The next map to be made of the Philippines will be on the scale of 1:1,000,000.

All this work is in accordance with the plan presented to the

Geographical Congress at Bern in 1899, by Dr. Penck, for a map of the world on this scale, the sheets to be limited preferably by meri-



AREAS OF THE UNITED STATES DRAWN FOR REPRODUCTION ON THE SCALE OF 1 : 1,000,000.

dians and parallels. Up to the close of last year only three nations had prepared map sheets in accordance with this plan. France made the first step. The Geographical Service of the French Army

issued a series of maps of the Antilles, Persia and China on this scale. The cartographic department of the Royal Prussian Land Survey followed with a map of eastern China, a number of sheets of which are now completed; and the Intelligence Division of the War Office of London is now publishing a large map of Africa on the uniform scale. All these enterprises are helping to carry out the scheme of a uniform map of the world the progress of which will be advanced to an important extent by cooperation in the western hemisphere.

A LETTER FROM PROFESSOR W. DEECKE.

SIR,—With reference to the review of my book on Italy* in No. 10 of Vol. XXXVII of the BULLETIN, permit me to state that the book has been translated without my knowledge and consent, and that I must therefore decline all responsibility for the alteration or omissions or any other liberties the translator may have taken with the text of the original.

Greifswald, October 21, 1905.

W. DEECKE, Ph.D.,
Professor in the University of Greifswald.

To the Editor of the BULLETIN.

GEOGRAPHICAL RECORD.

AFRICA.

THE BRITISH ASSOCIATION IN SOUTH AFRICA.—Professor W. M. Davis, of Harvard University, has lately contributed to the New York *Nation* and to the *Boston Transcript* five letters giving a general account of the recent visit of the British Association to South Africa. The two letters in the *Nation* give a more formal account of the meetings and of the itinerary of the various excursions; the three letters in the *Transcript* describe the more personal events of the voyage to Cape Town, of the journey into the interior as far as the Victoria Falls of the Zambezi, and of the voyage home from Beira by the East Coast. Some four hundred over-sea members, including sixteen foreign guests, of whom five were from the United States, took part in this great excursion. The plans were so carefully laid that every arrival and every departure occurred on dates that were

* Italy. A Popular Account of the Country, its People and its Institutions (including Malta and Sardinia). By Professor W. Deecke. With numerous Maps and Illustrations. Translated by H. A. Nesbitt, M.A. London: Swan Sonnenschein & Co., Ltd. New York: The Macmillan Co., 1904.

planned before the party left England—except that there was an unexpected delay for those who came back by the East Coast steamer, on account of the obstruction of the Suez Canal by the explosion of the steamer *Chatham*.

Prof. Davis's references to his personal experiences indicate that he accompanied several geological excursions; the first led by Rogers, Geologist of Cape Colony, in the Karroo, where the east and west ranges and valleys stand in the same relation to the plateau of the Veld that the Appalachian ridges and valleys of Pennsylvania and Virginia bear to the Allegheny plateau; the second excursion in Natal, led by Anderson, Geologist of Natal, in association with Molengraaff, formerly Geologist to the South African Republic; the third in company with Hatch, President of the Geological Society of South Africa, to Vereeniging on the Vaal River, and the fourth to the northeastern part of the Transvaal, led by Hall of the Geological Survey of that colony.

The visit to Victoria Falls, the farthest point inland, was made by the entire party in three special trains, and was greatly enjoyed by every one. We note that Prof. Davis spoke at the recent meeting of the National Academy in New Haven on the Dwyka glacial formation of South Africa, and that he is to address the Boston Society of Natural History early in December on Geological and Physiographical Observations in South Africa. We are glad to announce that Prof. Davis will address the American Geographical Society at Mendelssohn Hall on Feb. 20 next, the title of his lecture being "With the British Association in South Africa."

AMERICA.

The Association of American Geographers.—This Association will meet at the house of the American Geographical Society on Tuesday and Wednesday, Dec. 26 and 27, holding morning and afternoon sessions. The Association was organized in Philadelphia in December last year, and its membership is limited to persons who have done original work in some branch of geography. The programme will include the reading of papers by members, some of which will be illustrated by lantern-slides. The Bulletin is requested to announce that the Association extends a cordial invitation to members of the American Geographical Society to be present at its meetings.

Progress of the Alaska Boundary Survey.—Superintendent Tittmann of the U. S. Coast and Geodetic Survey informed the Society on Nov. 10 that at that time the Alaska boundary surveyors were either leaving or had left their fields of work owing to the inclemency of the weather. The season during which the demarcation surveys of the Southeastern Alaskan boundary can be carried on lasts for about five months, or from June to October. The heavy snows do not disappear from the lower slopes of the mountains until June, and when they begin to melt, the surveyors contend against the torrential floods in the narrow mountain gorges through which the melting snows and glaciers discharge. Aside from the great physical difficulty of transportation and the inaccessibility of the mountains, the rains and clouds which hide the mountain peaks interfere with the operations during the greater part of the short season in which the work can be carried on.

Mr. Tittmann added that during the field season just closed the surveying and demarcation parties were distributed as follows:

A Canadian party marked the crossing of the line on the Salmon River which

flows into the Chilkat, and an American party continued last season's work on the main Chilkat River, the crossing of Glave Creek having been monumented in a previous season;

Another American party marked White Pass and the crossing of the upper valley of the Skagway and determined the geographical positions of several peaks with reference to the coastwise triangulation with which the boundary peaks are to be connected;

A Canadian party marked the line from the first peak south of the Stikine River to Mount Whipple and was engaged in the triangulation beyond;

An American party carried the necessary triangulation up the Unuk River, marked the crossing of the line below the cañon and determined the boundary peaks to the east and west of the river;

A Canadian party operated at the head of the Portland Canal, working westward from the monument established by the American and Canadian Commissioners during the previous season.

THE HEIGHT OF MOUNT WHITNEY.—Mr. Henry Gannett informs us that the U. S. Geological Survey last summer ran a line of levels from the Pacific Coast by way of Los Angeles and Mohave and Owens Lake Valley to the summit of Mount Whitney, giving it a height of 14,499 feet. This entire line was double-rodded, and is doubtless accurate to within a foot. This appears to settle the much-disputed question of the height of this peak. It slightly exceeds in height any other mountain in the United States, outside of Alaska. Mount Rainier, in the State of Washington, was determined by 13 vertical angles to be 14,363 feet high; so that Mount Whitney surpasses it by more than 100 feet. It is also higher than the loftiest summit in Colorado. The determination of Mount Shasta by means of many vertical angles gives it a height of 14,380 feet.

UNDERGROUND WATERS OF LOUISIANA.—*Bulletin* No. 1 (1905) of the Louisiana Geological Survey gives information now available concerning the underground waters of the State. The serious study of this question began in 1899-1900, and it is now possible, by consulting maps based upon these investigations, to make a very fair estimate of the underground water prospects of any district. The well sections published in this report show about what may be expected concerning the nature and thickness of the various strata penetrated before water is reached. Mr. Veatch, working conjointly for the United States and the Louisiana Surveys, has compiled a long catalogue of localities with true heights above mean Gulf level. This is of great use for the investigation of underground waters. A list of these altitudes filling 55 pp. is published as an appendix.

TERRESTRIAL MAGNETISM IN LOUISIANA.—*Bulletin* No. 2 (1905) of the Louisiana Geological Survey shows what has been accomplished in the establishment of meridian lines for the use of surveyors and what measurements have been made to ascertain the changes in the earth's magnetic field within the State. Louisiana is the third State in the Union to have a satisfactory magnetic survey including all three elements—declination, dip, and intensity. Before the magnetic work had far advanced various reports dealing with this branch of geophysics in Louisiana indicated that East declination was decreasing at the rate of 3′ per annum. The later work has proved that former calculations were incorrect, and that since about 1898 East declination has been increasing at least 1′ annually. Every surveyor in the State now has a ready means of finding what the index

error of his compass is. The pamphlet contains an isogonic chart of the world and an isomagnetic chart of Louisiana.

Tide Gauge Work in Louisiana.—The Louisiana Geological Survey announces (*Bulletin* No. 3, 1905) that it is beginning the work of precise levelling in the southern part of the State. One purpose is to supply bench marks for local surveys, especially for canal and railroad enterprises. All local lines may then be referred to one datum plane, and the time saved by local surveyors in running and correcting level lines will be important. Another advantage will be the determination, in the course of time, of the direction and rate of vertical movement of the earth's surface in this region.

Origin of the Channels Surrounding Manhattan Island, New York.—Under this title Prof. Hobbs (*Bull. Geol. Soc. Amer.*, Vol. 16, 1905, pp. 151-182) presents a great mass of facts and considers their bearing upon the problem of the origin of the valleys in and around New York City. By reference to previous literature he shows that it is the prevailing opinion that these channels, which give to New York its peculiarly favourable water frontage, are due to the influence of weaker rock strata, notably limestones, which, by weathering and stream erosion when the land stood at a higher level, gave rise to valleys now occupied by ocean water because of depression of the land. He then presents a great deal of evidence, obtained by painstaking gathering and study of records from borings and excavations, showing that, in fact, there is little correspondence between the directions of the limestone belts and the water front. For much of its distance Harlem River crosses limestone and gneiss in a direction transverse to the strike of the rocks; the numerous excavations beneath bridge piers and in tunnels in East River show hard rock, and not limestone, as the prevailing rock; and the North River extends along the contact of two series of rocks, the Newark traps and the older crystallines of Manhattan Island. From the observations which he has made Hobbs concludes that the water front of New York City owes its form, not to normal stream erosion, but to the guidance of lines of fracture. R. S. T.

Origin of the West Indian Archipelago.—No living geologist has studied the West Indies as extensively as Prof. R. T. Hill, and whatever he may write upon this subject is worthy of the closest attention. In a recent paper (*Bull. Amer. Geol. Soc.*, Vol. 16, 1905, pp. 243-288) he takes a strong stand against the views set forth, especially by Spencer, that this archipelago represents the remnants of a lost "Antillean continent" and that the channelways among them are drowned river cañons. Hill divides the archipelago into four groups on the basis of origin—(1) the Bahamas, submerged banks of unknown origin now covered by wind-blown coralline sands; (2) the Great Antilles, true mountain-folds accompanied by old igneous intrusions; (3) the South American Islands (Trinidad, etc.), which are disconnected outliers of the South American continent, analogous to Long Island; (4) the Windward Islands, which are ocean-born volcanoes, built up by frequently-repeated eruptions similar to those recently observed in Martinique.

Prof. Hill's paper contains a great deal of fact relating to the physical geography and geology of the archipelago, and particularly of the Windward Islands. The highest land altitude in the Windward Islands is 5,000 feet, and the greatest sea depth 17,064 feet, giving a total relief of over 22,000 feet from the sea-floor, 29 per cent. of which is above sea-level, 71 per cent. below. With

the exception of Barbados these islands are composed of volcanic ejecta supplemented by deposits of limestone derived from marine organisms which lived along the shores and were later added to the land by uplift. There are no granite or ancient sedimentary strata and no transported drifts or gravels indicating former continental relations. The history of the Windward Islands involves "volcanic eruption, marine planation, secular upheaval, and lime-making oceanic life" is the conclusion which Prof. Hill has reached from his studies of the region; and it may be added that most physical geographers will probably agree to this conclusion. R. S. T.

Baron Erland Nordenskjöld's Work in Northern Bolivia.–Reuter's Agency has received from this explorer some details of his study of Indian tribes during the past eighteen months in northwestern Bolivia. With three comrades he left England in January, 1904, crossed the Andes to La Paz, and then made his way into the forests to the north. He visited three tribes—the Yamiacas, Guarayos, and Atsapuacas—who until recently lived in the pure "stone age." No white man had previously visited the last-named tribe, though they were using some implements made by whites that had reached them through other tribes. The explorers were very well received by the natives, but were unable to get into contact with a fourth tribe whose territory was crossed, as the people would have nothing to do with the visitors, though closely watching them from a distance. Baron Nordenskjöld says that the Quichuas and Aymaras living around Lake Titicaca are a very interesting study, as they have retained many customs unaltered since the time of the Incas. The explorers suffered much from illness, which forced them to abandon their researches earlier than they had intended.

Progress on the Guayaquil and Quito Railroad.—The British Consul at Guayaquil reports that during the year ending last August the Guayaquil and Quito Railroad was pushed forward, and is now running three trains a week to the important and populous town of Riobamba. The line is now levelled for a considerable distance beyond that town, and it is expected that Ambato will soon be reached. An American capitalist is establishing a system of automobiles, which are expected to make the journey from Riobamba to Quito within twelve hours, thus reducing the time occupied between Guayaquil and Quito to two days.

ASIA.

Seaweed Industries of Japan.—In this Bulletin for November, 1904, the writer called attention to an interesting comparison of American and Japanese fisheries. Recently there has been issued, first, as a part of the *Bulletin* of the Bureau of Fisheries, 1904, Vol. XXIV, pp. 133-181, and, second, as a separate "extracted" from the above, a rich body of material relating especially to the seaweed fisheries and dependent industries of Japan. Hugh M. Smith is the author. The value of seaweeds prepared in Japan exceeds $2,000,000 annually, and this excludes large quantities which never enter commerce, but are used where prepared by the families of the fishermen. This magnificent output is due (1) to the great extent of the coast-line, bringing a large proportion of the people near the sea, (2) to multitudes of harbours large and small, (3) to the abundance and variety of useful algæ, which flourish in their marginal waters, (4) to the ingenuity of the people, developed under long experience and adjustment, in putting the various kinds of plants to the best use, in utilizing them to the fullest extent, and in devising methods of collecting and preparing them.

The industry has grown along four lines—*kanten* or isinglass, *funori* or glue, *kombu* or food preparations, and the extraction of iodine. In the first division, the industry consists of gathering the algæ in the shallow waters of the sea, drying them on shore in the sun, transporting them to the hills, where their preparation is best carried on, and then cleaning and boiling, straining, etc., to reduce the material to a thick pulp when hot. It cools in moulds into sticks or bars of hardened jelly ready for market, where it is sold to be used at home for food, soups, sauces, etc., and abroad for jellies, desserts, sizing of textiles, clarifying liquors, and in making moulds for plaster-of-paris works. The product is the agar-agar of the bacteriological laboratory.

In the second, seaweed glue is prepared by simple processes wrought on the cleaned and dried sea algæ. The glue is used for glazing and stiffening fabrics, also as is laundry starch. Japanese women sometimes clean their hair therewith.

Kombu is a general name given to a variety of seaweed foods. Dried kelp is rolled into bundles, cleaned, boiled, and strained; and then the product shredded and put up into boxes for market. Kombu in one or more of its various forms is a part of the food of almost every Japanese family, often a standard article. Judging from its chemical composition it is valuable and nutritious. It contains from 4% to 6% of protein, 1% of fat, and 30% to 50% soluble non-nitrogenous matter.

The fourth product is iodine, which is derived from many species of seaweed, by burning the dried plants and washing the ashes and then concentrating the brine until all the salts are dry. The residue goes into a retort with sulphuric acid and the iodine is distilled off. The details of all these processes, besides several others, are given in the paper and well illustrated. G. D. H.

AUSTRALIA.

An Island of Iron in Queensland.—The Northumberland Islands belong to Queensland and lie off the east central coast in the Pacific, between the towns of Rockhampton and Mackay. One of the smallest islands in the Duke Group of this archipelago is Iron Island, of which a view, taken from Publication No. 194 of the Geological Survey of Queensland, is here given. The whole island is iron

IRON ISLAND IN THE PACIFIC.

ore except a strip from 60 to 120 feet wide on the west and a sand flat across its northern end. The island is 1,320 feet in length and 528 feet in greatest width, its highest point being 120 feet above high-water mark.

It is estimated by the Geological Survey that the amount of ore above high-water mark is 1,500,000 tons and that the additional ore available between high and low tide (23 feet) amounts to 750,000 tons, making a total of 2,250,000 tons of available ore. The rock on the western side of the island is greenish, highly-altered trachyte in which there has been great development of east and west cross quartz veins, probably formed before the iron was introduced into the surrounding region. On the south side of the island are three outcrops of pure white statuary marble from 10 to 20 feet across and 20 to 60 feet in length.

It is believed by some Queensland geologists that the ore metasomatically replaced limestone and slate and that the formation of ore may still be going on, inasmuch as the ridge top supports figs and scrub vegetation, showing that spring water is still reaching the surface. The ore consists chiefly of cryptocrystalline magnetite with massive hematite, and has scarcely a trace of impurity. Its specific gravity is 4.5 to 4.6. Blocks of ore up to 10 feet in diameter are piled up around the base of the island. No work has yet been done, but there will be no difficulty in mining down to tide-level; to work below that level a wall of ore will have to be left to prevent the entrance of the sea-water.

EUROPE.

SOURCE OF ELECTRIC POWER IN BAVARIA.—Major von Donat, the author of the well-known plan for the drainage and colonization of the Pontine Marshes, has placed before the Bavarian Government a project for creating a source of electric power sufficient to run all the railways of the country. He would secure this power by damming the River Isar between Wallgau and Vorderritz, thus creating a new lake, and connecting this with the Walchensee and the Kolchelsee. He has figured out that this would effect a saving of $10,000,000 a year.

THE GLACIERS OF THE WESTERN CAUCASUS.—The Imperial Russian Geographical Society has published a report by Mr. N. A. Bush (Memoirs, Vol. XXXII, No. 4) on "The Glaciers of the Western Caucasus." Mr. Bush was sent by the Society in 1896, 1897, and 1899 to the Kuban Territory and the Suchum district (both north and south of the Western Caucasus) to study the glaciers and flora. The volume deals with the results of the glacial investigations. It describes nearly all the glaciers in the Kuban Territory and probably most of those in the Suchum district. The number of known glaciers on the northern slope of the Western Caucasus is 230, of which Mr. Bush explored 224. The number of glaciers on the southern slope is unknown, but 54 were explored by Mr. Bush.

All the glaciers of the Western Caucasus are receding, this process having begun no less than 25 years ago. The retreat of glaciers of the first class has of late been very pronounced, but irregular; one glacier receded 45.5 feet, and another 241.5 feet in two years. The number of glaciers increases from west to east—that is, according as the height of the main ridge increases.

POLAR.

THE MELVILLE-BRYANT DRIFT CASKS.—At a meeting of the Geographical Society of Philadelphia on Nov. 1, President Bryant reported the recent recovery of two of the drift casks that were set afloat by the Society in the Arctic Ocean north of Bering Strait, in the hope that the recovery of some of them might throw new light on the direction of Arctic currents. President Bryant said in part:

I am able to announce that two of the drift cask messages have been received in Philadelphia. The

first record shows that it was cast adrift by Captain Tuttle of the revenue cutter *Bear* on Aug. 21, 1901, about 85 miles northwest of Wrangell Island. It was recovered by Captain A. G. Christianson on Aug. 17, 1902, near the entrance to Kolyuchin Bay on the Siberian coast, west of Bering Strait. It is evident that this cask did not get a good start. In the one year less four days of its drift the course it followed of 380 miles to the southwest was probably influenced by local currents which exist near Bering Strait.

The other cask had a longer voyage, and doubtless a more eventful history. Placed on the floe ice northwest of Point Barrow, Alaska, in 71° 53′ N. Lat. and 164° 50′ W. Long., by Captain Tilton of the steam whaler *Alexander*, on Sept. 13, 1899, it was recovered 1 mile east of Cape Raudanupr, on the northern coast of Iceland, on June 7, 1905.

Mr. Bryant read the following from a letter written by Admiral Melville:

More of the casks have come through, but have not been found; while others, no doubt, have been found but not reported. There is no telling how long the cask found in Iceland drifted about in open water before it was cast ashore. A ship drifting the same way, no doubt, might have come through two years earlier. . . . No doubt others have passed around Cape Farewell, Greenland, and are now on the west coast, and if they are not picked up will . . . eventually come south in the Labrador current. We will yet hear of more of them.

Size of Antarctic Icebergs.—Capt. Robert F. Scott (*Geog. Journ.*, XXV, 1905, p. 356), speaking of the huge tabular icebergs of the Antarctic, states that of the hundreds of icebergs seen by him few exceeded a mile in length and 150 feet in height, while the vast majority were less than a quârter of a mile across. The largest iceberg seen was estimated to be 5 or 6 miles in length and to have about the same width. In the same region one iceberg was estimated to be 240 feet high. Captain Scott considers that Murray's estimate of seven parts below water to one above is too high, and that five to one is nearer the truth. This conclusion he bases upon the (1) shoalness of water in which the bergs were aground, (2) an eye estimate of the proportion indicated by an overturned iceberg, and (3) the appearance of the ice, which apparently contains much air. Among his illustrations is an excellent picture of a typical iceberg. R. S. T.

VARIOUS.

Report of the Eighth International Geographic Congress.—The United States Congress authorized the printing of this "Report" at the expense of the National Government. It contains 1064 pp. Of the papers offered to the Congress, 119 are printed in full or in abstract. They include nearly all the contributions read at the Congress; but, unfortunately, a number of notable papers do not appear, as, for one reason or another, the manuscripts were not obtained by the Printing Committee.

The reports of these International Congresses have been welcomed by teachers of geography in European Universities as valuable sources of reference. The present volume will be included in this list of worthy books, though naturally, the Congress having been held so far from European centres of geographical interest, it was much smaller than its predecessors, and its literary output was by no means so large. It would be pleasant to meet with fewer typographical errors in the book, but criticism in this and other matters is practically disarmed by the fact that the task of preparing this large volume for the press was a gratuitous labour on the part of the Printing Committee.

Centennial of the Trip of Robert Fulton's First Steamboat.—To mark the centennial of the trip of Robert Fulton's first steamboat in the Hudson River, in October, 1807, the Committee on Plan and Scope of the Fulton Centennial Commission has recommended the construction of a memorial arch in Battery Park and

the establishment of a marine museum, on a basis similar to that on which the Metropolitan Museum of Art and the American Museum of Natural History were founded.

Bulletin of the Geographical Society of Philadelphia.—It is announced that, beginning in January next, the *Bulletin* of the Geographical Society of Philadelphia will be issued every three months. Prof. Emory R. Johnson will be the responsible editor, and will have the co-operation of Mr. Walter Sheldon Tower as associate editor. The past year has been the most prosperous one in the history of the Society—judging by the increase in members and the general activity of the organization.

The Explorers' Club.—A club of this name has been formed in New York City with rooms at No. 23 West Sixty-seventh Street. Its membership is limited to men who have been engaged in exploration. The objects of the Club are to further exploration and to bring explorers together in social intercourse. It is intended to hold monthly meetings, at which illustrated talks will be given. The club has been organized with Brig.-Gen. A. W. Greely as President and Mr. H. C. Walsh as Secretary. The first meeting at the rooms was held October 26, when lectures were given by Mr. Frank P. Chapman, who described his studies of the flamingo, and Professor Herschel Parker, of Columbia University, who told of his experiences among the Canadian mountains.

The Coyote.—Too often the study of geographic conditions stops with physiographic and climatic factors. A paper by D. E. Lantz (*Bull.* 20, Biol. Surv. U. S. Department of Agriculture) entitled "Coyotes in their Economic Relations" emphasizes an additional point. Plant and animal life which man can bring into service, or which he must combat, may be a very important factor in the general problem of Geographic Influence. The author discusses the range, species, food, and habits of coyotes in North America. They may be found from Costa Rica to Athabaska, and from the Pacific to the Mississippi. Their exceeding numbers and their increase under the new régime of pioneer civilization, and added food supplies of poultry, lambs, sheep, calves, colts, pigs, and house refuse, are two striking features.

The coyote has been found beneficial, in that he feeds upon rabbits, prairie dogs, several kinds of rats and squirrels, and mice, all of which the farmer wishes to dispense with. But the animal does not stop with these classes of food. He catches weasles and skunks, which assist man in his warfare with injurious insects. He destroys game, as quail, grouse, wild ducks and geese, and even kills deer and antelope. Now that civilization has brought within his range many domestic animals which furnish a more savoury relish than the wild game, and that man has deprived him of much of the latter, by exterminating, at least locally, the wild animals formerly fed upon, the coyote shows his influence by visits to the poultry roosts, turkey ranges, duck ponds, pigeon cotes, pig pens, and sheep and calf corrals. Even the family cats kept as mousers have often been taken. He is most destructive, however, as an enemy of the sheep industry, which he has succeeded in driving out of many Western localities.

Poison, trapping, and even systematic hunting with Government bounties to pay expenses have not been effective in controlling this depredator. He has proved as formidable an obstacle to man's occupancy and utilization of much of the pasture land of the West as has the jackal to the development of ostrich, cattle, and sheep farming in South Africa and the rabbit to pastoral pursuits in

New South Wales, Australia. Experiments with various kinds of fence in the West are leading to the conviction that the coyote can be successfully mastered by artificial barriers.

G. D. H.

Comparing Text-books of Geography.—In the *Elementary School Teacher* for October, 1905, is an article entitled "A Consideration of Geography Texts," written by Professor Kenyon of the San Francisco Normal School. It is devoted to a painstaking, judicial, and discriminating consideration of the modern school text-books of geography, and especially of the Redway, Morton, Tarr and McMurry, and Roddy series. The several books reviewed are all criticized as to the character of the maps, the author favouring the plan of having a physical map of a continent followed by a political map with the physical features underlying. The illustrations in the several books are not considered generally successful, though the results from wood cuts have certain advantages.

The general uniformity of the content is considered as being unfortunate, as it shows little real evolution in geographies in the last hundred years.

The following table showing the pages devoted to each division of the subject, with allowances for difference in the size of the pages, brings this out clearly:

	General Geography and Principles.	United States.	Rest of North America.	South America.	Europe.	Asia.	Africa.	Australia.	Appendix.
Redway.........	41	43	15	10	18	14	6	4	26
Morton	39	44	22	10	20	14	8	6	17
Frye............	65	63	12	9	16	15	10	5	8
Tarr & McMurry.. (2d & 3d books)	57	80	16	14	55	16	12	10	16
Roddy	19	42	14	10	20	14	9	7	4

The author favours maps not on a uniform scale, as is illustrated in the Tarr & McMurry series, and commends especially the Frye and the Redway for the use of the necessary topical summary, wholly or largely lacking in the other books.

The conclusion that "A *bona fide* text will have two essential parts: one of these an atlas made up of maps and such tables of statistics as are needful in ordinary reference, the other a minutely specific course of study for the teacher's guidance," to which should be added a "copious fund of geographical readings," is undoubtedly theoretically true. As a matter of fact the plan of separating the atlas and the text has been tried twice in this country with absolute failure. To be effective such a text would need two atlases—one for school use and one for home use. The mechanical and practical difficulties are too many to make this plan effective in America, though it is carried out elsewhere.

The author's points as to the essential qualities of a text are accurate and clearly expressed. Any one seeking a text-book would do well to apply these points to any text as a measure of that text's efficiency.

R. E. D.

Our Geographical Literature.—Dr. Cleveland Abbe, Jr., of the United States Geological Survey, is the American collaborator for the Annual *Bibliotheca Geographica* of the Berlin Geographical Society. Dr. Abbe would be glad to

receive authors' separates at above address. If separates are impossible, full titles with limiting pages, numbers of illustrations, and volume reference should be sent. R. E. D.

GEOGRAPHY IN NEW YORK CITY SCHOOLS.—The Board of Education for the City of New York revised the course of study for the city schools in June, 1905. As a result the work in geography is somewhat simplified and the order of study of the continents has been somewhat changed. It is now necessary for a pupil to have studied North America, and especially the United States, in detail by the end of the fifth year. Hence pupils leaving school at this time, as so many do, will know something of their own country. Singularly enough, however, Africa, Asia, and Australia are studied in considerable detail—once in the sixth and once in the seventh year, while the United States are only studied in detail once in the fifth year. North America and Europe are studied in a large way in the first half of the seventh year, but not so as to give the best understanding possible of the salient geographic features of the home country. R. E. D.

DR. GILBERT'S GIFT TO DENISON UNIVERSITY.—*The American Geologist* says that Dr. G. K. Gilbert has given to the Department of Geology in Denison University upwards of 1,000 volumes of literature, consisting of U. S. Geological Survey reports, State Reports, reprints, proceedings, and other valuable books. It will be remembered that the library of the University was destroyed by fire some time ago.

PROFESSOR STEVENSON'S MAP STUDIES ABROAD.—Professor E. L. Stevenson of Rutgers College returned in October from Europe, where he carried on his map studies with gratifying results. His purpose was to give careful examination, in various libraries, to early cartographic material pertaining especially to America, to make search for hitherto unknown and unpublished material, to meet specialists, and to arrange for the reproduction of certain important early maps. He was so fortunate as to make two or three important finds, and to get on the track of valuable maps little known or altogether unknown. Arrangements have been made to continue the publication of fac-similes of early maps. Professor Stevenson's tour took him to England, France, Germany, Switzerland, Italy, and Spain, where officials, librarians, and specialists gave him every facility.

U. S. BOARD ON GEOGRAPHIC NAMES. DECISIONS NOVEMBER 1, 1905:

* BUCHAREST: City in Roumania. (Not Bucarest, Bukarest, Bukharest, nor Bukhorest.)

CEDAR: River in Eastern Iowa. (Not Red Cedar.)

* CHUCKEY: Post office and railroad station, Greene county, Tenn. (Not Chuckey City, Chucky, Fullen, Fullen's, nor Fullens.)

DE SMET: City, Kingsbury county, S. D. (Not Desmet.)

DELEVAN: Post office and railroad station, Colusa county, Calif. (Not Del Evan nor Delavan.)

DELRAY: Post office, railroad station, and village, Wayne county, Mich. (Not Del Rey, Delrey, nor Delrey Junction.)

DRY PASS: Passage between Kosciusko Island and Prince of Wales Island, southeastern Alaska. (Not El Capitan nor Klawak.)

---

* Reversal of former decision.

East New Market: Election District, post office, railroad station, and village, Dorchester County, Md. (Not East Newmarket, nor New Market.)

* Ketchikan: Post office and village on Revillagigedo Island, southeastern Alaska. (Not Kitchikan.)

* Littleton: Post office and railroad station, Jefferson county, Ala. (Not De Berniere.)

Manitick: Mountain in Granby, Hartford county, Conn. (Not Manatick, Manatuck, Manitake, Manitook, Manituck, .Mannatuck, nor Mantick.)

Mount Wiessner: Mountain, Shoshone county, Idaho. (Not Mount Wiesner, Old Baldy, Wessner's Peak, Wiesner's Peak, nor Wiessners Peak.)

St. Joe: River, tributary to Cœur d'Alene Lake, Idaho. (Not St. Joseph, St. Joseph's, nor St. Josephs.)

Sooes: River, Clallam county, Washington. (Not Suez, Tsoo-e-ez, nor Tzues.)

* Swans: Island, Hancock county, Me. (Not Swan Island, nor Swan's Island.)

† Valetta: Capital of Malta. (Not Valetta.)

The Gesellschaft für Erdkunde, of Berlin, held a Memorial Meeting on the 29th of October, in honour of the late Baron Ferdinand von Richthofen.

A commemorative address was delivered by Prof. Dr. E. von Drygalski.

The Société de Géographie, of Rochefort-s/Mer, announces the death of its President, M. Paul Charron, on the 9th of October, at the age of 73 years.

American Geographical Society.

Announcement.—The next meeting of the Society will be held at Mendelssohn Hall, No. 119 West Fortieth Street, on Friday, January 5, 1906, when Dr. Otto Nordenskjöld will describe the incidents of the Swedish Antarctic Expedition.

NEW MAPS.

Africa.—Stanford's New Orographical Map of Africa. Scale, 1:7,286,400, or 115 miles to an inch. Four sheets. Compiled under the direction of H. J. Mackinder. E. Stanford, London, 1905. (Price, in sheets, 16s.; mounted on rollers, 20s.)

This map has been very carefully compiled for use in the school room. Six tints of blue show ocean depths to over 15,000 feet; 6 tints of brown show elevations above sea-level to over 15,000 feet; and olive green shows land below sea-level. Thus the deepening tints of one colour are used for the land and those of another colour for the sea. This simplifies the colour scheme, and, in the opinion of many teachers, is worthy of general adoption. The contour lines are drawn at the same intervals above and below sea-level, enabling comparisons to be made which emphasize the essential plateau character of Africa. The great submarine ridge extending through the mid-Atlantic, on which St. Helena and Ascension islands stand, contrasts most effectively with the bordering depths. In addition to the land-forms, many place-names are very distinctly printed.

* Reversal of former decision. † A curious decision.

GALLA LAND.—Die Galläländer. Nach den neusten Forschungsreisen gezeichnet. Von Carl Schmidt. Scale, 1:1,500,000, or 23.67 statute miles to an inch. Petermanns Mitteilungen, No. 10, 1905, Gotha.

An excellent specimen of compilation from original route surveys. Twenty years ago this large region east and west of Lake Rudolf was almost entirely white on our maps. Since that time eighteen exploring expeditions have traversed the country and supplied a large amount of data, which Mr. Schmidt, a member of the cartographic staff of the Justus Perthes house, has faithfully recorded. White areas of considerable extent still exist, these unexplored districts being chiefly in the east and in the northern part of British East Africa, which is still little known except along the proposed boundary between Abyssinia and the British possessions. Those American map makers who would like to study German methods of compiling maps from material found in the pioneer route surveys will find the sheet worthy of careful attention. The value of the map is increased by the fact that most of the surveys were much above the average quality of map results attained by African explorers; and a number of them, including the route surveys of the American explorer Donaldson Smith, rank very high as mother material.

UGANDA.—Surveys of the Anglo-German Boundary Commission on the south-west frontier of Uganda. Scale, 1:500,000, or 7.9 statute miles to an inch. By Lieut. Col. C. Delme-Radcliffe. The *Geog. Jour.*, Nov., 1905, London.

This frontier was delimited in 1902-4. The trigonometrical net of the Commission along the parallel of 1° S. Lat. and that of the British along the north-western and northern coasts and islands of Victoria Nyanza are shown in an inset. The topography on both sides of the boundary line is denoted, many heights are indicated in feet, and on the margin the latitude and longitude of the 44 main triangulation stations are given.

AMERICA.

U. S. HYDROGRAPHIC OFFICE CHARTS.

Pilot Chart of the North Pacific Ocean, December, 1905. This chart is especially notable for the information it contains concerning the fishing banks in the North Pacific Ocean. Each fishing bank is designated by a number on the chart. On the reverse is a comprehensive table of the fishing banks, giving their names and positions, their approximate area, depth of water, nature of the bottom, and the kind and quantity of fish found on each bank. This information was compiled from publications of the U. S. Bureau of Fisheries and from other sources.

Pilot Chart of the North Atlantic Ocean, November, 1905. Red lines indicate the path followed by the centre of each of the more severe cyclonic storms during November in previous years.

CANADA.—Geological Map of the Island of Montreal and vicinity. Scale, 1:253,440, or 4 statute miles to an inch. Geological Survey of Canada, Ottawa, 1905.

Coloured to show the geological formations; geological section on the same horizontal scale.

CANADA.—Map of the City of Montreal and vicinity showing location of wells. Scale, 3,000 feet to an inch. Geological Survey of Canada, Ottawa, 1904.

The two maps above mentioned illustrate Mr. Frank D. Adams's Report on

"The Artesian and other Deep Wells on the Island of Montreal." Within fifteen years many borings have been made along the east side of the Island of Montreal to obtain water. Many of them are in the City of Montreal, and in most instances large supplies of good water have been obtained. The situation of each well is indicated by a coloured dot showing whether the water is potable, sulphuretted, or saline, or whether the boring is a dry one.

CANADA.—Geological Map of Pictou Coal Field, Nova Scotia. Scale, 3⅛ inches to a statute mile. Geological Survey of Canada, Ottawa, 1904.

Mr. Henry S. Poole has written a report to accompany this revised map of the Pictou coal field. A glance at the map shows that the field has been geologically much disturbed. The map does not show surface contours, but the directions of the underground levels at various depths are indicated.

CANADA.—Geological Map of parts of Counties Renfrew, Lanark, Lennox, and Addington, Frontenac, and Carleton (Perth sheet, No. 119). Scale, 4 miles to an inch. Geological Survey of Canada, Ottawa, 1904.

The map accompanies the report by R. W. Ells on the geology of a part of eastern Ontario. On the map margin are comprehensive notes describing the formations shown in colours on the map.

CANADA.—Geological and Topographical Map of the Klondike Mining District, Yukon Territory. Scale, 1:126,720, or 2 statute miles to an inch. Geological Survey of Canada, Ottawa, 1905.

Illustrates a report by R. G. McConnell on the Klondike gold fields. The topographical map on which the geological data are imposed was constructed by Mr. J. F. E. Johnston, largely from his own surveys. Mr. McConnell spent several years in collecting the geological data which appear in his report and map.

ASIA.

CENTRAL ASIA.—Map accompanying results of V. I. Roborovski's Expedition to Central Asia in 1893-1895. Scale, 1:4,200,000, or 66.2 statute miles to an inch. (In Russian.) Drawn under the supervision of Major-General Bolshev. Imperial Russian Geographical Society, St. Petersburg, 1900.

The routes of Roborovski, Kozlov, and other explorers are shown, and on these the positions of thirty-one places have been astronomically determined, these points extending between Issyk-kul and Zaisan-Nor in the northwest and Kuku-Nor and the Amne-Matshin Mountains in the southeast.

CENTRAL ASIA.—General Survey Map showing routes traversed by V. I. Roborovski and P. K. Kozlov in 1893, 1894, and 1895. Scale, 1:1,680,000, or 26.5 statute miles to an inch. (In Russian.) Four sheets. Drawn under the supervision of Major-General Bolshev. Imperial Russian Geographical Society, St. Petersburg, 1900.

Red lines indicate the route traversed by Roborovski, green lines show Kozlov's route, and black lines the routes of other explorers in the large region between Issyk-kul in the west and Kuku-Nor in the east.

CENTRAL ASIA.—Map of Nan-Shan. Scale, 1:840,000, or 13.2 statute miles to an inch. (In Russia.) Two sheets. D. Rudnef's Cartographical House, St. Petersburg, 1900.

This is a more detailed map of the surveys made by Roborovski and Kozlov in

1893-95 in this mountain range in northeastern Tibet. The map is included in the Results of the Roborovski Expedition. Fifteen points were astronomically fixed.

CHINA.—Map of China. Prepared for the China Inland Mission. Scale, 1:3,168,000, or 50 statute miles to an inch. Four sheets. New Edition. London, Edward Stanford, 1905. (Price, 8s.)

The map shows the distribution of the China Inland Mission stations in red and those of other Protestant missions in blue. The geographic features are laid down with unusual care for publications of this nature; and as the scale is much larger than that used by atlas sheets generally, the map will serve well in many respects for general reference. Heights are given in feet, railroads in operation, building, or proposed, are included, and symbols indicate the importance of the towns.

BRITISH INDIA.—Ceylon. Scale, 1:1,013,760, or 16 statute miles to an inch. Report of Surveyor-General, P. D. Warren, Colombo, 1905.

Shows in colours the topographic surveys carried out between 1897 and 1904, the block surveys in the same period, and the regions under survey in 1905.

AUSTRALIA.

WESTERN AUSTRALIA.—Map of Western Australia showing the Geological Maps issued since 1896. Scale, 75 statute miles to an inch. W. D. Johnson, Minister for Mines, Perth, 1905.

The map accompanies the Progress Report of the Geological Survey for 1904.

EUROPE.

CENTRAL EUROPE.—Liebenow-Ravenstein's Special-Radfahrerkarte von Mittel-Europa. Nos. 33 Hamburg, 55 Amsterdam, 84 Cologne, 99 Frankfort on Main, 123 Paris, 143 Munich. Scale, 1:300,000, or 4.7 statute miles to an inch. Verlag Ludwig Ravenstein, Frankfurt am Main, 1905. (Price of each map, M. 1; mounted to fold, M. 1.50.)

Specimen sheets of an excellent cycling and automobile map of Central Europe in 164 sheets. The roads are distinguished according to their importance for bicycling and automobile purposes. Dangerous places where special care must be taken are designated by red dots, distances between the more important points along the roads are given in figures, and much other information needed by travellers along the highways is supplied. On the Frankfort sheet the Gordon-Bennett automobile route of 1904, roughly in the form of an ellipse, between Weilburg in the north and Homburg in the south, is indicated.

LOWER AUSTRIA.—Schulwandkarte des Erzherzogtums Österreich unter der Enns. Compiled by J. G. Rothaug and Prof. Friedrich Umlauft. Scale, 1:150,000, or 2.38 statute miles to an inch. Four sheets. G. Freytag & Berndt, Vienna, 1905. (Price, unmounted, M. 13.50; mounted on linen with rollers, M. 17.)

A superior large-scale school map of the comparatively small area embraced in Lower Austria. The map is based on trigonometrical surveys; light and shade as well as contours are used to express the forms of the land. It includes both the plain and the mountain country surrounding Vienna and gives an effective bird's-eye view of land-forms, drainage distribution, comparative importance

of the towns, etc. Geographical students of lower Austria in the middle grades and their instructors are certain to find this map helpful.

TURKEY.—Zur Geologie von Nordalbanien. Scale, 1:1,500,000, or 23.67 statute miles to an inch. *Jahrbuch* der k. k. geologischen Reichsanstalt, Band LV, 1905, Vienna.

Accompanies a report by Dr. Franz Baron Nopcsa. The author's investigations in the north and central districts supplemented the work of predecessors in other districts, and thus made it possible to produce this geological sketch map in colours.

ENGLAND.—Salisbury Plain District. Scale, 1:126,720, or 2 statute miles to an inch. John Bartholomew & Co., the Edinburgh Geographical Institute, Edinburgh. (Price, 1 sh.)

One of Bartholomew's superior maps for tourists and cyclists. Roads, distinguished as first-class, good, and passable, are in red, seven tints show differences in elevations, and sea depths are given in three shades.

SCOTLAND.—Bathymetrical Survey of the Fresh Water Lochs of Scotland. Scale, 1:21,120, or 3 inches to a statute mile. Under the direction of Sir John Murray and Laurence Pullar. The *Geog. Jour.*, Nov. 1905, London.

The lochs included on these plates are Shin (upper and lower sections) Merkland, a'Ghriama, Fiodhaig, and seven smaller lochs, all in the Shin basin, excepting Loch Buidhe of the Fleet basin. Like the other plates in these series they are in the best style of the Bartholomew house of Edinburgh.

NORWAY.—(1) Kart over det Nordlige Norge. Scale, 1:1,000,000, or 15.8 statute miles to an inch. With inset of the Lofoten Islands on a scale of 1:400,000, or 6.3 statute miles to an inch. (2) Kart over det Sydlige Norge. (In four sheets.) Scale, 1:600,000, or 9.4 statute miles to an inch. By Oberst Nissen. H. Aschehoug & Co., Christiania, 1905. (Price, North Norway, kr. 2.75; Northwest sheet of South Norway, kr. 1.50; other three sheets of South Norway, kr. 2.50 each.)

These are tourist maps which also serve well as general maps of the kingdom, as they are on much larger scales than the usual atlas sheets, give practically the complete geographical nomenclature of Norway clearly printed, and show the drainage, mountain features, and coast-lines. Roads and paths are shown in red. The four-sheet map of South Norway is accompanied by an index of names.

POLAR.

ANTARCTICA.—Sketch map to illustrate the paper by Dr. Charcot of the French Antarctic Expedition, 1903-5. Scale, 1:2,500,000, or 39.45 statute miles to an inch. The *Geog. Jour.*, Nov., 1905, London.

The map shows the route and surveys of the expedition along the west coast of West Antarctica and distinguishes the coasts that were surveyed, or first seen by this expedition. Insets show Wandel Island on a large scale with the winter quarters of the party; also the route of the ship from and to South America.

ATLASES.

ATLAS UNIVERSEL DE GÉOGRAPHIE.—Ouvrage commencé par M. Vivien de Saint-Martin et continué par Fr. Schrader. 90 Cartes. No. 66 Afrique Française,

Feuille III (Madagascar et Dépendance). Scale, 1:5,000,000, or 78.9 statute miles to an inch. Hachette & Co., Paris, 1905.

The map is based upon the large-scale maps published by the Geographic Service of the French Army between 1889 and 1903. This more exact information, generalized and finely engraved on steel, results in the best atlas sheet of Madagascar up to this time. There are three insets: the central part of Madagascar from the Indian Ocean inland on a scale of 1:1,250,000, or 19.7 statute miles to an inch; the island of Réunion on the same scale, and the French Somali coast on the same scale as that of the main sheet.

BOOK NOTICES.

Das Alter der wirtschaftlichen Kultur der Menschheit. Von Ed. Hahn. Heidelberg, Carl Winter's Universitätsbuchhandlung, 1905. 246 pp. (Pr., M. 6.80.)

Students of the history of primitive man will find many interesting contributions to their science in this book, which represents a summary of the life-work of the author in this line. One of his main objects is to disprove the traditional idea of an evolution of the human race through the stages of hunter, herdsman or nomad, and agriculturist. While the fact remains that these stages of culture have alternated at different periods in the history of primitive man, the results of modern ethnology no longer allow the acceptance of their universal succession in the order named.

The first observation which spoke against this popular tradition was made by Alexander von Humboldt, who found that almost all the native tribes of South America practised some form of agriculture, while, with the single exception of the Incas, no attempts at the domestication of animals were ever observed. The author's own studies of domestic animals and the history of their domestication corroborate Humboldt's statements.

In speaking of domestication, especially of that of cattle, two aspects of the question must be kept apart—viz., the use of the animal as draught cattle or as carriers of burdens in general and as producers of food, especially of milk. The negroes of Central Africa, for instance, keep large herds of cattle for the sake of their milk, but never thought of using them to draw or carry anything before the arrival of the whites. They, too, like the South American tribes, have some agriculture without ever having put an animal to the plough. This and similar observations lead the author, with Ratzel, to distinguish two entirely separate forms of agriculture by the names of hoe-culture and plough-culture. The former is the one found with primitive peoples all over the globe; it consists in the planting of seeds or roots by means of simple tools of a more or less hoe-like shape. The plants, or clusters of plants, grow in small hillocks, which may be heaped up more or less regularly; and while the land thus cultivated may, when laid out with some care, present an appearance not very different from a regular field, it will upon closer investigation always be characterized by the entire absence of furrow-lines. A field under plough-culture will, on the other hand, always be characterized by the conspicuous lines drawn by the plough, which means that

man has discovered the secret of enlisting the strength of an animal and of using a mechanical device in order to avoid the hardship of manual labour which is connected with hoe-culture. Plough-culture is, therefore, found exclusively with races possessing an old and highly-developed civilization. Whenever the word "agriculture" has been used so far, it has been synonymous with plough-culture, which, without the other, is indeed the highest of the culture stages. In the new understanding it can no longer be used to denote this stage; for, as hoe-culture, it stands at the beginning of all civilization.

Upon this basis, the author's results are, in short, as follows: Taking the use of fire as the starting-point of civilization, the first modification of the traditional scheme must be made concerning the hunter stage. Hunting presupposes a definite purpose and plan to secure possession of some game, which is more than can be expected of primitive man at his start. The study of the lowest races of the present rather shows that in this stage man gathers whatever comes in his way and seems fit to eat, animal or vegetable alike. Thus the gathering stage preceded that of the hunter, and remnants of the same are still found among the aborigines of Australia. At a later stage a division of labour takes place. Man goes out to get the game, but he is far from living on flesh food exclusively; he charges the women of the tribe to get the vegetable contribution to the meals. In proportion as he, from a mere gatherer, rose to the stage of hunter, woman was by this division of labour made the first agriculturist; hoe-culturist. Half-eaten roots covered with earth, together with other remnants of meals, or roots and fruit buried in the ground as offerings for the dead, would sprout and grow, and thus eventually teach the women how to secure vegetable food with less trouble. Consequently, wherever agriculture (*sc.,* hoe-culture) is found with primitive peoples, it is the women who till the soil, while the men hunt, go to war, or do nothing.

Many evidences furnish proof that also in the parts of the world now given over to plough-culture, the latter was preceded by hoe-culture in primitive times. Its main product was millet, the venerable old food-stuff, which figures in all the Germanic folk-lore as the national food, and forms the contents of the magic boiler which is never empty. Its almost universal propagation, from the polar circle to the subtropics, would alone speak for its age; but there is also unquestionable evidence of its cultivation among the relics of the lake dwellers. To-day millet is hardly known as a food-stuff to the people at large, and in its place we pray for our daily bread—one of the most graphic illustrations of the supplanting of the hoe by the plough.

Concerning the transition, too, from the hunting to the nomadic and from the nomadic to the plough-culture stage, important modifications must be made. The familiar idea of man having been attracted by the cow's milk, and having, therefore, begun to keep cattle, after which he started putting the ox to the plough, must almost completely be abandoned. Even if there were not the difficulty of taking a product which is the result of domestication as the cause of the same, two most important civilizations stand out as unmistakable proofs of the fallacy of the milk theory. The first is China, where from time immemorial the ox has been the helper of the ploughman, but where nobody has ever seen a native touch milk; the other is ancient Peru, where the only domestic animal of prehistoric America was bred; while there is not even the record of an attempt to milk the llama.

Turning again to the primitive nations of the present to furnish us a key for the past, the author finds a more probable incentive for the domestication of

animals in the love of pets found with certain primitive tribes. According to von den Steinen, for instance, the homes of the Indians of central South America are zoological gardens on a small scale, so full are they of animal playmates of their inhabitants. In a similar way the smaller of our present domestic animals—the dog, sheep, and goat—were probably first chosen for companions of man, and their confinement would not be so close as to prevent them from breeding, the main difficulty encountered in the study of the beginnings of domestication being that animals suddenly deprived of their liberty will not breed. In proportion as man became familiar with the characteristics of the different animals he would find out that they were good for more than mere comradeship, and use them as carriers of burdens, and the experience acquired in contact with the smaller animals enabled him to experiment also with the larger ones—the donkey, the camel, the horse, etc. With those at his command, the development of nomadic life was only a question of time.

Even nomads, however, did not live on the flesh or milk of their herds exclusively, but on their respective halts set the women's hoes to work to furnish the supplementary dishes, or preyed upon the neighbouring agricultural (*sc.*, hoe-cultural) tribes for vegetable contributions. Thus agriculture, far from following the earlier stages, is, in the form of hoe-culture, contemporaneous with each, and actually the oldest of any culture recorded.

The surprising fact (which cannot be denied, in face of the author's evidence) is that the plough-culture has nowhere developed from hoe-culture. The use of the plough drawn by the ox or horse appears as something entirely novel, and radically incongruous with anything that preceded it. So wide is the gap between the two stages that to the Greeks nothing short of a miracle could explain the invention of agri-(*sc.*, plough-)culture, and modern science, too, has as yet been unable to bridge it over. Wherever plough-culture now takes the place of the older form, it must have been introduced as an entirely foreign element, originated, perhaps, many thousand miles away on an area especially adapted to its development, and spread from there over its present area, supplanting the hoe by the plough, and the hoe-products by the cereals.

The author looks upon Babylonia as the original centre, and his argumentation is as follows: The foundations of plough-culture are twofold—the invention of the plough, and the putting the ox to it. The plough cannot have been the first vehicle to which the ox was put, as an animal which is yet to be broken in will never cut a straight furrow. The ox must have been accustomed to harness-work before he was made to plough—in other words, the chariot or the wheeled vehicle must have preceded the plough.

Ths author traces the invention of the wheel back to the old forms of worship in which the idols were carried in processions. When they proved too heavy for the carriers, they were drawn along, and wheels attached to the statues. To raise them high above the crowd, they were placed on platforms with wheels attached to them: the first chariots. When the priests who originally hauled the vehicle came to be replaced by a draught animal, the ox was chosen because he was sacred. It is well known what an important part the moon played in the religion of Babylonia , and the resemblance of the horns of ox and cow to the crescent was early noted. Herds of cattle, therefore, were early kept in enclosures near the temples, in Babylonia as well as in other countries, and this was the first step at domesticating cattle. Cow's milk, as a sacred fluid, was consecrated to the gods as food in the regular offerings, just as bread was offered in the Hebrew cult (an

interesting instance how precious, and therefore new, the product of plough-culture must have been in Palestine when the Mosaic laws were given). We know who, in fact, ate similar offerings, and very probably it was through the priests that the use of milk was established among the people. When it came to choosing a draught animal for the sacred chariot, none could be better suited for the purpose than the ox, already attached to the service, and probably fitted for it by a special consecration, as in other cults. In this way the ox was trained to harness, and the subsequent putting it to the plough was a natural step.

The invention of the latter, too, can be derived from a religious act. The first ploughing was probably a kind of consecration of the soil, a symbolical fertilisation of the field. The loosening of the soil by the sacred animal would naturally bring better results than that done by an ordinary mortal; thus the hoe was attached to the ox, and, changing its vertical position to a horizontal one, the first primitive plough ripped the earth and cut the first furrow. In a hard-baked soil, such as the rich alluvial bottom-lands form in a climate like that of Babylonia, the difference between the vegetation along the lines of loosened soil and that on the hard stripes between will soon show, and thus the Babylonian farmer learned the lesson of planting his seeds in the furrows.

The geographical condition of the land of its origin is responsible also for another characteristic of plough-culture. In a steppe climate, agriculture is possible only through irrigation; and we know what was done in this line in Babylonia. But irrigation requires farming on a large scale—a combination of the individual fields into one large area, over which the water is conducted. Such space was not available in the city; the fields had to be far away from the homes, outside the city walls. There women could not be allowed to work, and thus plough-culture grew up as man's work; while hoe-culture, which could be pursued near the home, was the work of the women. Thus it comes that all over Europe, among the old resident farmer population who preserve the traditions of their fathers, the farmer takes care of, and sells, the products of the fields, while the wife has the care and income of the vegetable and fruit garden, the only part of farming in which hoe-culture has survived to the present.

It has been considered desirable to give the book a more detailed review than is generally accorded to books of its size, because it is not very probable that it will find many readers in this country, on account of the crabbed and difficult German in which it is written. While literary perfection is not the foremost requirement of a scientific book, neglect of clearness has certainly been carried too far in this instance. Not only is the style one of the best illustrations of the ill-famed "Gelehrten-Deutsch," which it requires a special effort even for the native to read, but the presentation of the subject is also interspersed with so many digressions of a personal or political nature that the unity of the plan is entirely destroyed. A revision from these points of view before another edition is made would certainly contribute very effectively to secure for the author a wider recognition of his work. He now complains of the lack of this recognition, which he fully deserves. M. K. G.

Explorations in Turkestan, with an Account of the Basin of Eastern Persia and Sistan. Published by the Carnegie Institution, Washington, 1905.

This fine volume embodies the results of an expedition in 1903, under the direction of Professor Raphael Pumpelly, who was assisted by Professor W. M. Davis,

Mr. Ellsworth Huntington, and Mr. Raphael W. Pumpelly. Of the five papers offered, the first is introductory, by Professor Pumpelly, and bears the title, "Archeological and Physico-Geographical Reconnaissance in Turkestan." The general purpose was to make a preliminary examination of the Trans-Caspian region, preparatory to further study of problems of early human occupation and accompanying physical changes. In both these fields Turkestan is characterized as a virgin territory promising large results to detailed studies, town sites and tumuli are named for definite beginnings, and the important physiographic problems are stated.

The second paper is by Professor Davis, and gives an outline of physiographic observations. Following the order of his itinerary, he describes the Bosporus as a normal river valley, submerged since the advent of man. He also gives evidence suggesting the conclusion that the Caspian and Black Seas may have been confluent before the sinking of the Bosporus region. He studied the Quaternary shore-lines of the Caspian near Baku, where strands occur up to about 600 feet, but not as well worked as those of Bonneville or Iroquois. On the east of the Caspian, at Krasnovodsk, and in the Balkan Mountains, shore-lines at 200 feet or a little higher suggest probable warping, when compared with those at Baku.

There is a discussion of the Aralo-Caspian Basin in the Kara-Kum, of desiccation and the development of the Usboi channel as an old outlet from the Aral to the Caspian waters. Vast aggrading plains lie at the foot of the mountains of Turkestan, and these are believed to be largely fluviatile, in harmony with the later trend of opinions concerning similar deposits on the Great Plains of the United States. There are interesting references to the loess, followed by observations in the Tian Shan Mountains.

Mr. Raphael W. Pumpelly describes physiographic features of the Pamir, and Mr. Huntington presents two extended essays of great interest, one giving a reconnaissance in Central Turkestan, and the other describing the Basin of Eastern Persia and Sistan. All of the observers unite in the conclusion that there are evidences of two, three, and even five epochs of glaciation in certain of the localities, with long interglacial intervals in at least some cases.

Fruitful efforts were made, in the direction of correlating the glacial expansions, both with great block uplifts of strata and with the terraces cut in vast volumes of valley waste, and with the fluctuating levels of the lakes, and it is believed that these physical changes can be placed in their true relations with the human occupations of the region.

Mr. Huntington's explorations in Persia continued his work through the winter of 1903-04, and his report is a paper of profound interest. The basins of Eastern Persia are remote and little known, being a region rimmed about with lofty mountains, and receiving enormous deposits of waste to form its endless plains. Persia is described as a "typical example of an arid country," and we have in Mr. Huntington's paper perhaps the most direct and fruitful attempt yet made to correlate land-forms with climatic conditions.

Both continental position and its basin character contribute to the aridity of Persia. The basins are due to warping, but this is not of a peculiar sort. Basins must also have been formed by the making of the Alps and the Himalayas, but in those well-watered regions streams or lake outlets have effectively cut the rims of the basins and kept a connection with the sea. But in a closed region like Persia there stretch endless fans and floors of the waste which can make no escape to the sea. Lacustrine and river terraces show climatic oscillation which may have continued into the historical period.

The closing pages discuss the relations of climate and history, and show how the data of history, tradition, and physiography tell the same story of modern desiccation of the land. A. P. B.

An Introduction to the Geology of Cape Colony. By A. W, Rogers, Director of the Geological Survey of Cape Colony, 451 pp. With many illustrations and a colored geological map. Longmans, Green, and Co.

The formal survey of the Colony was undertaken in 1896. This volume is designed as a popular manual, by which students and other residents of the Colony may learn the structure of their own land.

The southern margin of the Colony consists chiefly of much-disturbed formations of the Cape Period, the beginning of which is given as early Devonian. Pre-Cape rocks also exist in the south and over large areas along the west coast. The great central basin, however, and the larger part of the Colony, show rocks of the Karroo System, apparently of Permo-Carboniferous and early Mesozoic age. It would be much to the convenience and enlightenment of the average reader if the local names were more clearly correlated with the general nomenclature of geological periods. The fossils of the Karroo rocks are all of land or fresh-water kinds, and the maximum thickness of the beds is not less than 14,000 feet.

Perhaps the most interesting fact in the volume is the evidence for widespread glaciation in the Dwyka, or early Karroo areas. Thus it becomes essentially contemporaneous with the glaciation shown by the Gondwana System of India and the Permo-Carboniferous ice accumulations of Australia. Whatever the cause, it must have been existent over a wide region of the earth's surface, and can hardly have been due in any degree to great altitudes.

The evidence for glaciation is scarcely open to question. Thus large blocks rest in a matrix of sand or mud, and show the agency of icebergs. Conglomerates reposing on a striated floor are interpreted as ground moraine. In some cases *Roches Moutonnées* and "crag-and-tail" structures are found under the conglomerates. A striking view of a glacially-scratched surface is given on page 157. The range of localities in the Colony is also great, giving the general conclusions a high degree of certainty.

Interesting evidence is also given of a former cycle of denudation, resulting in a peneplain leaving remnants, in the southern parts of the Colony now often 1,000 feet or more above the sea. High-level terraces and gravels also appear from 600 to 1,000 feet above the present river beds. Thus the Table Mountain series shows its much-folded masses, with flat tops, and dissected by the rivers, which have been rejuvenated in the uprising of the land, and in the inauguration of a new cycle. As a natural accompaniment of these changes are the "numerous S-curves" mentioned by the author—incised meanders between cliffs several hundred feet in height.

Among the superficial deposits are eolian limestones attaining a thickness of 500 feet. Natural salt-pans, both along the coast and inland, are described, and theories given as to their origin. Of human remains such chipped implements as have been found are of no great antiquity. A. P. B.

Konstantinopel und das Westliche Kleinasien. By Karl Baedeker. xxiv and 275 pp., 9 maps, 29 plans, 5 sketches and Index. Karl Baedeker, Leipzig, 1905. (Price, M. 6.)

This volume has recently been added to the long series of Baedeker's guide books. The six chief routes to Constantinople are considered in turn as the

tourist is likely to approach the capital of Turkey by way of Budapest, Constantza, Galatz, Odessa, Athens, or Salonica. The routes are described and a number of maps of the chief towns along the way, as well as the starting-points, are inserted. Sixty pages are given to Constantinople, followed by twenty-five pages describing the excursions from that city, on the Bosporus, to Brusa and its neighbourhood, and to many points on the Anatolian railroad. The remainder of the volume deals with journeys to the western part of Asia Minor, including Smyrna, Ephesus, the Plain of Troy, and the Turkish islands in the Ægean Sea.

It is a curious fact that the zeal of the Turkish censor is directed towards the confiscation of guide books. If tourists, however, are careful, when they cross the frontier or enter one of the Turkish ports, to slip their guide book into a pocket, they may retain possession of this valuable accessory, as the vigilance of the authorities seems to be confined to the custom houses.

Christianity in Modern Japan. By Ernest W. Clement. viii and 192 pp. Map, half tone Illustrations, Appendix and Index. American Baptist Publication Society, Philadelphia, 1905 (Price, $1.)

The book presents a general survey of the work of Christianity in Japan. The subject is not covered in great detail, but a comprehensive view of the whole work and its results is given and an adequate bibliography is included, which will enable those who desire to go into the question more deeply to find the best books on the topic in our language. Many excellent photographs show churches, schools, and other features of the work. It may be worth noting that in this Protestant publication the long labours of the Roman Catholics in Japan are treated with the highest appreciation.

Handbuch der Heidekultur. Unter Mitwirkung von Otto von Bentheim und andern Fachmännern. Bearbeitet von Paul Graebner. viii and 296 pp., 48 figures in the Text, Map and Index. Wilhelm Engelmann, Leipzig, 1904. (Price, M. 9.)

This is a detailed account of the heath lands of Germany and how they may be made profitable. Dr. Graebner has for years given great attention to the scientific study of these heaths, or moors, and his views as to the method of their formation have been very generally accepted. In his opinion they may develop on sands or under water, but in north Germany at least, and probably in other countries, they may have taken the place of forests. He attributes the disappearance of the forests and their replacement by the various types of heath vegetation chiefly to the removal of salts by percolating waters. Another fact that he emphasizes, though not so strongly as some other writers, is the absence of air in the soil, which, as well as the very poor quality of the soil, has its part in making the heaths and their meagre vegetation what they are.

There is a considerable amount of purely scientific matter in the book, but the purpose of the volume is chiefly practical. How may the heaths of Germany be turned to good account? This problem is discussed by Mr. von Bentheim, who advises deep ploughing as an essential preliminary. The preparation of the land for farming or tree-planting is discussed in detail, and the view is expressed that in many cases Government co-operation, or at least a union of the farmers into societies for mutual helpfulness, will be necessary in the reclamation of these lands. The book concludes with a study of the various forms of vegetation from a botanical standpoint.

Das Sonnenwendgebirge im Unterinnthal. Ein Typus alpinen Gebirgsbaues. Von Dr. Franz Wähner, o. ö. Professor an der K. K. Deutschen Technischen Hochschule in Prag. Erster Teil. Mit 96 Lichtdrucktafeln und einer geologischen Übersichtskarte. Leipzig und Wien, Franz Deuticke, 1903.

Another of the large monographs devoted to special problems of Alpine geology. The Sonnenwendgebirge is one of the northern front ranges of the Tyrolese Alps, N.E. of Innsbruck, on the E. shore of the Achen Lake. It had hitherto been considered one of the less-disturbed parts of the Alps, but Dr. Wähner has found that this region, too, like so many others in those mountains, is full of unconformities resulting from overthrust flexures.

The Main Dolomite underlies the whole of it in mighty strata which are gently inclined toward the south. The crests of the individual ridges consist of younger formations, mainly of the author's "White Reef Limestone" (=Upper Dachstein limestone) and Jurassic limestones and hornstones. There is a marked difference in the structure of the eastern and western parts of the range. In the latter, four parallel ridges run E.N.E.-W.S.W., one of Dachstein and one of Jurassic rock alternately; while in the western ridges the relation between the orographic and geological features is much less pronounced. A still larger difference exists between the northern and southern parts of the region; the rocks of each correspond so little to those of the other, and the systems of folds are so radically unlike each other, that nothing but the hypothesis of a separate genesis of each can account for the differences.

A great part of the younger formations having been worn away, the denuded slopes of the ridges offer many good exposures of the contorted strata. By tracing a stratum of marly limestones of the upper Rhaetic, a facies of the Koessen beds, the author succeeds in ascertaining that the astounding thickness of the Main Dolomite (more than 6,000 feet) is due to its being folded over on itself several times, so that flexure fractures and faults occur along the synclines of the overthrust flexures, causing the more or less complete destruction of the intervening strata.

In the whole range the author distinguishes fourteen different sub-stages of Triassic and Jurassic deposits, from the Werfen shales to the Aptychus beds, and describes their palæontological, mineralogical, and stratigraphical characteristics, deriving from them the foundations for his explanation of the geological architecture of the region. In this part of the book a special study is made of a hornstone breccia which occurs between the Liassic limestones and the Aptychus beds. He calls it "Dislocations-Breccie" or "Druck-" (-pressure-) "Breccie," in opposition to the common breccias, which he designates as sedimentary. His definition of it comes very near the fault breccia of American geologists, and corresponds to the "breccia in situ" of Brögger. It is the product of the grinding of the rocks through the folding process, and consists of fragments cemented by finest rock meal, in which the original structure has been obliterated, and frequently a new process of crystallization can be observed. The fragments are full of fissures, several fragments can often be seen to come from the same original piece, their edges being serrated and the serrations interlocking at the junction of the edges in the way described by Suess as cranial sutures, and as pressure sutures by Rothpletz. At a very advanced stage of demolition the particles will show a kind of parallel structure indicating the direction of the pressure.

From such processes the author derives the formation of some marbles of that region. He denies the necessity of making the heat caused by the processes of

mountain-making responsible for the crystallization of the limestone, because wherever the "white reef limestone" was found forced in between other rocks the crystalline structure increased in proportion as the stratum grew thinner. He explains this by the action of the percolating waters, which, as the crushing of the strata proceeds, get more and more access to the fragments, dissolve the carbonate of lime, and allow it to re-crystallize. The more completely, therefore, the process of grinding is done, the more complete will be the transformation of the ground substance into crystalline rock.

The rest of the book is given over to detailed descriptions of the single ridges and peaks which, while of high value for the specialist, cannot be duly appreciated in a general review. Of the same special value is the wonderful and exhaustive bibliography of the subject which precedes the presentation of the author's own work, and the illustrations are splendid instances of the scientific value of photography.

M. K. G.

Das Neue Südafrika. Von Paul Samassa. 416 pp. C. U. Schwetschke & Son, Berlin, 1905. (Price, M. 5.50.)

This is neither a book of travel nor a volume of political essays, but an able and evidently an honest effort to portray South Africa in its present condition as it begins life anew with peace throughout the land. The region under the British flag, however, is now so vast and its interests and conditions are so varied that the whole subject could scarcely be treated in the compass of this book. The Governmental policy in Rhodesia, for example, and the serious misunderstanding between the white colonists and the Chartered Company are matters of grave import in the whole of north South Africa, but the author does not mention them. On the whole, however, he has certainly made a thoughtful contribution to the study of the country and of its leading problems. We have British views in plenty, but it is to the advantage of this book that it is written from the standpoint of the outside observer.

The author gives many facts relating to political and industrial life, and conveys the idea that, apart from its great mineral wealth, South Africa is really a poor land, and that agriculture can be developed only within narrow lines. He believes that a future uprising of the Boers is very improbable, and asserts that a process of the rapid "Africanization" of many of the English is now going on. He treats the native and labour questions, and says that away from the great trade routes "Cape Dutch," the language of the Boers, is more widely disseminated than English, and that the millions of blacks more easily learn to speak Dutch than English.

The Land of the Rising Sun. By Gregoire de Wollant. 8vo, pp. 401. Neale Publishing Company, New York and Washington, 1905.

A book upon Japan written by a Russian has a unique interest at this time. Mr. de Wollant's residence in Japan, as Secretary of the Russian Legation, was long enough to give him an intimate knowledge of the country and the people. This is shown in the first part of the book, which is devoted to the history, religion, customs, and superstitions of the people. The chapters upon literature, dramatic art, and the theatre are filled with information not usually found in the many books written upon this wonderful country. But the real interest of the book centres in the last two chapters, in which the author deals with Japan's foreign policy, her war with China and its results, and the war with Russia, which was in progress at the time the book was written.

It is surprising to be told that "Russia's occupation of Port Arthur was made necessary by the fact that Germany had gained possession of Kiaochau, and thus disturbed the balance of power," when all the world knows that Russia, backed by Germany and France, forced from Japan the Liaotung peninsula, and thus fulfilled her century-old ambition to obtain an ice-free port on the Pacific. The occupation of Port Arthur was soon followd by the assumption of jurisdiction over Manchuria.

The history of this period is a record of protests from the other Powers and broken promises on the part of Russia. The responsibility for the war, which was inevitable, Mr. de Wollant places wholly upon Japan. He says "the moment had arrived for conquering Korea and spreading her domination in China." He adds "Russia did not want war and was not ready for war," but "she would not be an easy prey like China, and Japan played a hazardous game in beginning such a war." "One need not be a prophet to foretell that it will be disastrous to Japan."

The Yellow Peril is dwelt upon with considerable fervour. A Japanese writer is quoted as saying that "the mission of Japan is to civilize Europe and reconstruct on Japanese lines its moral and religious life." The United States will no doubt be included in this missionary work, but Mr. de Wollant's greatest fear for this country is in the direction of its commercial interests. He says "the time will come when the United States will *painfully* discover what the advent of Japan means."

The Russian original is not always perfectly rendered in the generally excellent translation by the author's wife. M. C. G.

The Philippine Islands. By Fred W. Atkinson. iv and 426 pp. Maps and Illustrations. Index. Ginn & Company, Boston. 1905. (Price, $3.)

This is, on the whole, the most convenient book to which we may refer for precise information about the Philippines. All who have occasion to look for special facts about nearly any phase of the islands or their peoples have doubtless been impressed with the circumstance that, although a great deal of material is now available, most of it has not as yet been so well arranged and presented in recent books, official or otherwise, as to give the reader a clear idea of the facts; or, at least, the student must hunt through many pages or in different books before he feels that he has satisfactory knowledge of the matter he is investigating.

The book brings within the compass of an ordinary octavo volume a systematic account of our new possessions; and we think it will be considered as the most handy and one of the most accurate sources of reference. The author was formerly our General Superintendent of Education in the Islands, where he travelled extensively and had unusual opportunities for observation. He has faithfully, and with much success, carried out his endeavour "to show the real conditions, geographical, economic, social, and political; to picture the people and their characteristics, the different phases of the problem of tropical colonies, the possibilities, and the prospects."

There is an index, and the illustrations are numerous and good.

Trois colonisateurs. Par le capitaine Froelicher, ancien officer de l'armée d'Afrique. Ouvrage couronné par la Société de Propagande coloniale. Avec 3 photographies et 4 cartes dans le texte. Paris, Henry Charles-Lavauzelle.

An interesting account of the ups and downs of French colonisation in Algiers,

Senegambia, Tonkin, and Madagascar is here given by way of describing the colonial careers of the great founders of French colonial power: Bugeaud, Faidherbe, and Gallieni. In their historical sequence, the three men present three stages of the development of French colonial policy from its first beginnings in Algiers to the present. All three of them being soldiers, military occupation is naturally the foundation of their work, and the way in which each of them expands it into economic, and finally a moral, occupation illustrates in a striking manner the progress made by the French, and practically all the white nations, in the recognition of their responsibility toward their coloured wards. While the nature of the subject makes frequent repetitions necessary, the very minuteness of the records, which reflect with faithful accuracy both the successes and the reverses of France along the different lines of colonial expansion, makes the book very helpful reading for any one interested in our own colonial efforts, and for this reason ought to be read as widely as possible. M. K. G.

Notes d'Analyse Géographique. Conditions qui Déterminent la Valeur Économique d'Un Pays. Par Emile Chaix. IV and 48 pp., 43 Diagrams and Maps. Philippe Durr, Geneva, 1905.

Professor Chaix, who occupies the Chair of Geography at the Commercial High School, Geneva, has prepared these notes on the system of instruction which he has used for the past ten years. Many economic text-books print data that are not correlated with the principles upon which they depend. The memory of the student is thus unduly exercised, though the aim should be rather to cultivate his reasoning powers and facility in analysis.

Professor Chaix subordinates the memorizing of facts, and subjects the data to analytical treatment. The student is desired to reason out the economic value of a country from the prevailing conditions and to deduce the chief economic possibilities from physical and other facts before him. The book gives specimen analyses of the natural conditions in certain regions, and draws conclusions as to their effect upon organic and mineral productions, industry, communications, the inhabitants and their institutions, and the student is asked to make similar analyses relating to other countries. The book should interest many of our teachers. In its fundamental idea and its main features, however, this method is by no means unknown in many of the normal and other schools of the country.

Les Chemins de Fer Coloniaux en Afrique. Troisième Partie. Chemins de Fer dans les Colonies Françaises. Par E. de Renty. xii and 495 pp., 2 Appendices and 10 Sketch Maps. F. R. de Rudeval, Paris. 1905. (Price, 5 fr.)

This volume completes the important contribution that Captain de Renty has made to the history of African development. It is devoted to the railroads of the French colonial possessions, the two preceding volumes (BULLETIN, 1905, Aug., p. 511) having covered the ground for the other parts of Africa. The three volumes give the fullest and best account of the history and present condition of railroad development in the African colonies that has yet been written, and the work will be of enduring value as a record, sufficiently complete for most purposes, of the beginning and progress of these colonial enterprises up to the end of 1904.

The French railroads are treated with special fulness, and the history of each of them includes an adequate statement as to the nature of the peoples, regions, and climates through which it passes, so that the conditions in Africa which help

or hinder railroad-building may be fully understood. In this sense, Captain de Renty's work contains much geographical information based on the latest and most detailed investigations. One of the appendices gives a table containing the statistics of all the colonial railroads in Africa now in operation or building up to Jan. 1, 1905.

A Handbook of Cyprus. Compiled by Sir J. T. Hutchinson and Claude Delaval Cobham. xii and 126 pp., Frontispiece and 2 Maps. Edward Stanford, London, 1905. (Price, 2sh., 6d.)

The fourth issue of this little book, which is a painstaking compilation of the matters most useful to know about the island. It is not a guide book of stereotyped pattern, but is especially valuable to those who may visit Cyprus, as the needs and wishes of the tourist are kept constantly in view. The black-and-white map is on a large scale, and gives a good idea of the land-forms, shows the roads, distinguishes Christian from Mohammedan towns, and prints place-names very fully. The small geological map is based on the larger map by Mr. Bellamy, published last year.

Baedeker de la República Argentina. Por Alberto B. Martinez. Second Edition. XV and 383 pp. With Maps and Plans of the Republic, Cities, Railroads, numerous Photographs, and Index. Jacobo Peuser, Buenos Ayres, 1904.

The introduction gives a description of the country, climate, agriculture, mining and other interests; also the cost of reaching Argentina by the various steamer lines. An unusually complete account of the city of Buenos Aires, with many illustrations, fills 137 pp. The various provinces are then treated in turn. The small pictures from photographs show many phases of Argentine life and industry, and the maps are on a sufficiently large scale to give all railroad stations and points of interest.

Amerikanische Landwirtschaft. Eine Reisestudie von Siegfried Strakosch. 187 pp., 56 Illustrations and 1 Map. Wilhelm Frick, Vienna. 1905.

The author in 1904 travelled through nineteen States of the Union studying the causes of the enormous development of our agriculture, and endeavouring to learn how much of it is due to "unequalled natural factors" and how much to improvements in farm methods. It is unfortunate that on his first page the writer should allude to "three great mountain systems—the Sierra Cascade Range, Rocky Mountains, and Alleghanies:" a slight confusion in our geographical nomenclature that seems to be merely accidental, for the description of our agricultural industries which follows is, on the whole, very clearly and accurately written. Mr. Strakosch states the facts that, in most cases, are best worth knowing, about the prices of our farm lands, the homestead and pre-emption laws, the scarcity of farm help and high cost of labour, the principal crops, the farm buildings, machinery, and cultural methods. He then describes types of farms in different parts of the country, our breeds of cattle and herd book societies, fruit culture, agricultural education, experimental stations, and many other influences which affect the standing of our great farming interests. Several chapters are given to the leading crops, grain elevators, transportation, the export trade, and the conclusions reached. The author attributes to the vast employment of farm machi-

nery the fact that the United States are able to produce five times as much grain as Austria-Hungary, though that empire, according to the statistics of the Jahrbuch für das Deutsche Reich for 1904, says that farming and forestry employ 10,512,019 persons in the United States, while in Austria-Hungary they employ 12,679,974. The book concludes with statistical tables which, like all the contents of the volume, are well selected and arranged.

Mohammed and the Rise of Islam. By D. S. Margoliouth. xxvi and 481 pp., 31 Illustrations, 1 Plan, and 2 Maps. Index and Glossary. G. P. Putnam's Sons, New York. 1905. (Price, $1.50.)

Dr. Margoliouth, who is Laudian Professor of Arabic at Oxford, says in his preface that since the lives of Mohammed by Sprenger, Muir, and others were written "knowledge of Mohammed and his time has been increased by the publication of many Arabic texts and the labours of European scholars on Mohammedan antiquities." Some of these scholars have elucidated much that was obscure, facilitated the understanding of Arabian history both before and after the Prophet, and supplied many fresh details of interest and importance. The present book (Heroes of the Nations Series) has had the advantage of this new material. As the title of the series implies, the book is written from the standpoint that Mohammed was "a great man who solved a political problem of appalling difficulty—the construction of a state and an empire out of the Arab tribes." The author gives the sources of his references in very numerous footnotes. He has composed a work on Mohammed and the rise of Islam that is at once scholarly and interesting.

Carpenter's Geographical Reader. Afrika. By Frank G. Carpenter. 336 pp, American Book Company, New York, 1905.

Carpenter's Africa completes the well-known series of geographical readers, describing mainly personal experiences and observations of the indefatigable author-traveller. The text is simple and interesting, even though at times it is a bit patronizing, the descriptions are to the point, and the illustrations are, as a rule, clear. The text is made easy for the pupil reader by the insertion of the phonetic spelling of each unusual proper name, the first time that that name appears in the text.

The maps are good, and as accurate as maps can be of a country in which political boundaries are constantly changing. We wish that Cape Agulhas had been inserted, so as to help remove the common impression that the Cape of Good Hope is the most southern point of Africa. The author uses the unauthoritative spelling of Kongo State for Congo Independent State. These minor matters, however, do not materially weaken the strength of an otherwise valuable addition to reference material for school use. R. E. D.

Laboratory and Field Exercises in Physical Geography. By Gilbert H. Trafton. VI and 90 pp. Ginn & Co., Boston, 1905.

Trafton's Laboratory and Field Exercises is a simple, definite book for beginners in physical geography, and particularly adapted for use in association with Davis's Elementary Physical Geography. Of the sixty exercises in the book, thirty-seven are devoted to the land and twelve to the atmosphere. The exercises on the land are particularly good, as they involve a careful study of selected sheets of the topographical atlas of the United States Geological Survey. The

book as a whole is more usable than several of its competitors, because it contains definite and detailed rather than general suggestions.

The several appendices include suggestions to teachers as to the use of the manual, as to the laboratory equipment necessary (this section being rather meagre), a bibliography of literature available on laboratory work, and a list of laboratory exercises suggested in several sources of reference. R. E. D.

A Laboratory Manual in Physical Geography. By Frank W. Darling. Chicago, Atkinson, Mentzer & Grover, 1905.

Darling's Laboratory Manual is almost unique in character, in that it is a manual of exercises, a note-book, and a partial laboratory equipment, all within one cover. It includes, in addition to the text, relief maps of the continents, outline maps of the world and the United States, ruled blanks for weather records, blank sheets for notes, cross section paper for construction of diagrams to scale, and a vegetation map of the world. More than two-thirds of the exercises are devoted to the land and the atmosphere.

The exercises are definite and practical, and, except for the topographic maps, on which are based most of the exercises in the book, the manual contains in itself the necessary material for laboratory use. Some of the exercises are, perhaps, too severe for first year high-school work, and the manual, therefore, is better adapted for use in the small but constantly-increasing number of schools in which physical geography is being taught, somewhat intensively, in the later years of the high school. Such manuals as this will help materially in making physical geography as definite and effective a subject in high schools as physics has so long been.

R. E. D.

An Outline Dictionary. Intended as an Aid in the Study of the Languages of the Bantu (African) and other Uncivilized Races. Edited by A. C. Madan. xv and 400 pp. Henry Frowde, London, 1905, (Price, 7s. 6d.)

The book has been prepared as a help in collecting vocabularies of the Bantu or kindred languages of Africa, or any other little-known language in an uncivilized country. It consists of a vocabulary of English words combined with a memorandum book for the recording of the foreign equivalents opposite the English words. Many suggestions are offered for the collection of native vocabularies and for spelling the words by the letters of the English alphabet. The book will be a convenience and a time-saver for investigators in this field.

Old Provence. By Theodore Andrea Cook. 2 vols. Vol. I, XXIII and 348 pp. and 44 photographic illustrations with maps and plans; Vol. II, xiii and 445 pp. and 34 illustrations. Charles Scribner's Sons, New York, 1905.

The author treats the history of old Provence with the same vivacity and charm of style that made his "Old Touraine" delightful reading. He had great wealth of material at hand, for Provence, in the delta of the Rhone, was the highway of the nations and the battlefield of the invader. The poetic, romantic, and dramatic elements in the history of Provence are handled with great skill in selection and in treatment. The work cannot fail to enhance interest in this region and to be a necessary part of the equipment of all Americans who visit it.

The first volume is devoted to this Roman empire on the Rhone, which is still illustrated by so many Greek and Roman monuments; the second volume

carries the story down to the close of the fifteenth century through the Crusades and the era of the Popes at Avignon. Perhaps the best bit of geographical description is in Vol. I, pp. 24-28, which treats of the work of the Rhone River and the manner in which, following natural laws, so large a part of the stream has been rendered unnavigable.

Les Irrigations en Égypte. Par Julien Barois. iv and 386 pp. With numerous Maps, Sections, Profiles, Plans, etc. Ch. Béranger, Paris, 1904. (Price, 30 fr.)

Mr. Barois, a civil engineer of distinction long in the service of Egypt, published a study of irrigation in that country in 1887. Egypt has since then been so completely transformed that the present work is entirely new. The book is a large octavo, handsomely printed, and covering all phases of irrigation as it has been developed and applied to Egypt. The Nile, the source of irrigation, has a chapter, and the soil and sub-soil, the basins of inundation, the irrigation canals, the dikes, barrages, and every other aspect of water utilization are fully described. It is a book that will be useful in every country where irrigation is important. The author says he hopes that the knowledge of the subject he acquired in Egypt may, through his book, be made useful in the French African and Asiatic colonies.

Essais d'Hydraulique Souterraine & Fluviale. Par Edmond Maillet. vi and 218 pp. and 48 pp. of Tables. Paris, Librairie Scientifique. A. Hermann, 1905.

A first-class work giving mathematical treatment throughout to this branch of engineering science. The theoretical side of the subject is first discussed, and in the second part the practical application of these ideas and theories is treated. The practical part of the work is in most respects the same as in the first edition, but the theoretical portion has been changed in many important respects.

A Manual of the Principal Instruments used in American Engineering and Surveying. 446 pp. and Illustrations. W. & L. E. Gurley, Troy, 1905. (Price, $0.50.)

Describes and illustrates most of the instruments used in surveying and map-drawing and the methods of handling them in the field.

West Africa Before Europe and other Addresses Delivered in England in 1901 ane 1903. By Edward Wilmot Blyden. iv and 158 pp. C. M. Phillips, London, 1905.

Dr. Blyden has been called the most learned man of the African race. Born in the West Indies over 70 years ago, he was nurtured in European culture, but has spent nearly all his active life in Liberia, where, through the press, the school, and the pulpit, he has incessantly worked for the development of his race. The four addresses in this little volume—"West Africa," "Islam in the Western Soudan," "Some Problems of West Africa," and "West Africa Before Europe"—were delivered in England and elsewhere between 1901 and 1903. They are vigorous and eloquent, and, like his earlier books, show a man who is capable of deep thinking and is saturated with facts and ideas relating to his race and its native home.

Der Mensch. Sechs Vorlesungen aus dem Gebiete der Anthropologie. Von Dr. Adolf Heilborn. vii and 110 pp. Illustrations and Index. B. G. Teubner, Leipzig, 1904. (Price, M. 1.25.)

Professor Heilborn, in this little book, presents the principles of anthropology in popular language and adapts them for general reading without the sacrifice of scientific spirit or accuracy. The numerous small illustrations are excellent. Among the topics are our present knowledge of the origin of man, types of human form, anthropological measurements, the races, their anatomical differences, and Tertiary man.

Die ärtzliche Mission unter Heiden und Mohammedanern. Von Hermann Feldmann. 174 pp. Verlag der Missionsbuchhandlung. Basel, 1904.

An instructive book published with the assistance of the "Verein für ärztliche Mission" and designed to stimulate larger participation by German Missionary Societies in the medical feature of the work. The medical methods and results of the evangelical Missionary Societies in all countries are fully described. Facts are quoted to show the humanitarian aspects of this work and its usefulness in stimulating the growth of other departments of missionary enterprise. The German Societies have not adopted medical missions so largely as those of other countries.

Promenades Lointaines: Sahara, Niger, Tombouctou, Touareg. Par le lieutenant Paulhiac, membre de la Société de Géographie de Paris. Préface par M. Hugues Le Roux. Un volume in 8°. (Prix, 5 francs.) Illustré de cent photographies et de deux cartes en photographie. Librairie Plon Nourrit & Cie, 8 rue Garancière, Paris, 1905.

Lieutenant Paulhiac's excursions in the countries of the Sahara and the Niger, to Tombouctou and the Touareg had for their object, not discovery, but the study of the territory occupied. For the author the adventurous cycle of African exploration is closed, and it is now a question of rendering valuable and renumerative the immense empire hewn out by the swords of valiant French soldiers, his precursors.

The book begins with a comparative estimate of the area of the French possessions in Western Africa; not less than six times the size of France.

The climate is marked by excessive temperature. It has but two seasons—the dry, which commences in October and ends in June; the wet, beginning at the end of June and terminating in September.

Senegal is inhabited by the Yolofs and the Toucouleurs. The Yolof is indolent, but he has nevertheless rendered service to the colonists. The Toucouleur is rebellious and intractable. He loves war for its devastation, for rapine and loot; he despises work, is fond of palaver, perfumery, jewels, and good cheer. Because he is not so black as his fellows he considers himself their superior; he treats those under him with disdain, and reviles them as a race of captives.

The Toucouleur woman is tall and well formed, with regular features and delicate extremities. The Lieutenant regards her as graceful and beautiful, which leads to the conclusion that the Toucouleur is more Arab than negro.

The Peule is placid, pacific, and pastoral, half nomad, half sedentary; the nomads follow their flocks, changing pastures with the seasons and returning to

the sedentary camps to exchange products, refit and again set out across jungle and desert. The Peule arms himself only for self-defence, and is a devoted adherent of the Koran.

The Bambara excites the admiration of the author; he is strong and muscular, with a big head, flat nose and thick lips, and built like a Hercules. The woman is of the same mould. The Bambara is tenacious, tractable, and a hard worker—qualities which make him an excellent slave and the victim of the predatory Toucouleur. The author believes that in the Bambara France possesses an element with which to achieve the prosperity of the Sudan.

The sons of the hostile chiefs, Yolof, Toucouleur, and Sarracolais, receive free instruction in the Government schools of Saint Louis and Kayes. The instruction is inefficacious, and the author suggests that schools be established in which agriculture shall be taught and that other instruction be discontinued.

The Moors and the Touareg inhabit the regions north of Senegal and the Niger. Both are of the Arab race, "rovers of the desert," and they pillage caravans as a profession.

The Moor is clean-shaven and bareheaded; the Moor woman goes veiled. The Touareg, on the contrary, is veiled, whilst the Touareg woman has her face uncovered—thereby a legend:

The Touareg, once less warlike than now, were attacked by a hostile tribe, and, retreating precipitately to camp, were reproached by their wives because of their cowardice. The women took up arms, attacked the enemy, and defeated him. Returning to the camp one of them tore her veil off and flung it in the face of one of the men. From that time until now the Touareg man has worn the *lithan* or veil, whilst the woman not only goes unveiled but sits in council with the men—a story which proves that the Woman's Rights Society discovered nothing new.

A chapter is devoted to the sanitary conditions of the Sudan, the insufficiency of food, the origin of diseases, and the native remedies employed; all of them very crude.

The author denounces the philosophy of Islam, which produces a civilization that is retrograde and decadent. He contrasts, absurdly enough, the progress of a half century in America with that of eighty years in North Africa by the French.

Lieutenant Paulhiac would combat the fatal influence of Islam by ruining the credit and authority of the *Marabout,* and this may be accomplished effectually by the Chiefs of Agriculture, taught and disciplined in the Colonial Agricultural School.

The author advises the construction of economical roads for animal traction tramways. He opposes the construction of an expensive Transaharan line, which is impractical, illogical, and ruinous. The Sahara is unproductive, and the Moors and the Touareg who dwell there have nothing to sell, nothing to buy. Commercially there is nothing in it; politically England, since the Convention of 1899, holds the Nile from its source to its mouth. As for the Touareg, France has only to hold the water sources and granaries to keep them in subjection.

The author concludes that the systems of colonization employed until now—1st, By companies; 2d, by colonial Administrations—are insufficient. He suggests the application, first, of the lesson inculcated in the maxim of the great Sully: "Ploughing and pasturage, the two great breasts of France;" the organization of Colonial Agricultural Schools, which shall teach the native almost exclusively the science of the cultivation of the soil; the construction of cheap roads of penetration; and inducements to draw the native scholars to the great commercial centres.

Thus the spirit of the Nigritian populations and the face of the country may be completely changed.

The duty before France is to devote herself to the task of creating in the Sudan a flourishing civilization based upon the principles of equity. To cite the final words of the author, the future depends upon *le travail, l'épargne, la justice et la paix dans l'amour de l'humanité* "—work, thrift, justice, and peace in the love of humanity.

CH.-L.

The Faroes and Iceland: Studies in Island Life. By Nelson Annandale. vii and 238 pp., 24 Illustrations, Appendix and Index. H. Frowde, London, 1905. (Price, 4s. 6d.)

These studies were made during a number of summer vacations spent on the islands. They illustrate the people in their physical character, education, government, and occupations. The influence upon them of their geographical environment is not strongly denoted. The author says that though the inhabitants of the Faroes are in-bred to a large extent, he has found no proof that this has resulted in moral, mental, or physical degeneration, unless possibly it may have produced some diminution in stature. The illustrations give striking aspects of the islands and the occupations of the people. The ravages of Turkish pirates from Algeria in the seventeenth century are described, and there is an appendix on the Celtic pony.

Das Riesen- und Isergebirge. Von P. Regell. 132 pp., 89 photographs, map in colours, and index. Velhagen & Klasing, Bielefeld and Leipzig, 1905. (Price, M. 4.)

The beauty and picturesqueness of the mountains on the border between Silesia and Bohemia, with their valleys, hamlets, towns, waterfalls, and people, are described in the entertaining manner and with the wealth of photographs which have made the high reputation of the "Land und Leute" Series, of which this volume is number XX. Some of the photographs illustrate important industries, as glass-blowing, wood-carving, etc.

The Configuration of the Rock Floor of Greater New York. By W. H. Hobbs. *Bulletin* No. 270, U. S. Geological Survey. 1905. 96 pp.

In his letter of transmittal to the Director, Mr. C. W. Hayes comments on the importance to local engineering and construction of the data contained in this report. Professor Hobbs pays tribute to the precision of some of the older maps, notably those of Randall, 1811-1821, and of Viele, 1874. Here at the present time is a centre of engineering enterprise more extensive than is elsewhere known to history, and now is the opportunity to seize upon facts which would otherwise be forever lost. There is a review of authors, with notes on their conclusions and discriminating references to the value of their work. Among these are Gale, Stevens, Newberry, and Dana, of the older generation, and Kemp, Merrill, Eckel, Gratacap, Julien, Peet, Russell, and the writer of the present Report.

Much of the structure of Manhattan is confidently stated to be the result of normal faulting. Maps of southern and northern Manhattan are presented, on which, in blue, are given the contours of the bed-rock surface. The maps show also the position of wells that reach to the rock floor, with the depth of that floor as referred to mean tide at Sandy Hook. A further symbol distinguishes borings that do not reach bed-rock, their bottoms being compared with the same datum.

It is now well understood that the East River lies in a rock cañon nearly 200 feet deep, and the North River in a cañon of even greater depth, 300 feet or more. These cañons are now, of course, filled in part with drift and silt. Gale's statement is approved, that Manhattan consists of "gneissoid islands" separated by low areas of drift. The largest of these islands occupies the central part of Manhattan, and several smaller ones lie to the north.

Detailed transverse sections are given, especially as made possible by the work of the Pennsylvania and Long Island Railway Companies, including the North and East River tunnels and the operations around the terminal site. There are sections approximating the lines of 31st, 32nd, 33rd, and 34th Streets. The data are afforded by 90 well-distributed core borings and about 75 intermediate wash borings.

The steep western wall stretches not only from Manhattanville southward to 81st Street, but continues still farther south along the pierhead line. The eastern wall is even steeper than the western. In a manner equally fortunate for our knowledge of the rock foundation of the island, we have the series of borings made longitudinally by the Rapid Transit Commission. The profile thus developed shows abrupt changes of level south of Union Square, the greatest depression occurring at Duane Street, where the floor is at a depth of 163.25 feet. North of Central Park, as far as 145th Street, rock was not encountered in tunnelling, but at the latter point a descent was made, to pass under the Harlem River, and limestone was penetrated.

In the opinion of the author a sunken block of gneiss and limestone lies beneath the Harlem flats, outlined on the west by a fault along Eighth Avenue, and on the south by a fault marking the northern wall of the Manhattan uplands, at the upper end of Central Park.

About two-thirds of the *Bulletin* are filled with a tabular record of 1424 borings. The tables furnish the location and the depth to bed rock both as given and as referred to U. S. datum at Sandy Hook; also, where known, the kind of rock. Footnotes in many cases give further details, and the whole affords permanent information of much value. A. P. B.

INDEX TO VOL. XXXVII.*

PAGE
Abbe, Cleveland, Jr. 741
Abbot, Henry L. Problems of the Panama Canal *noticed* 441
Accessions to the Library, 115, 243, 428, 622
Aflalo, M. Truth about Morocco *noticed* 309
Africa. Abessinien und die Evangelische Kirche. Von C. Paul, *noticed* 311
—— Bantu, Outline Dictionary of. By A. C. Madan *noticed* 761
—— Central, Pioneeering in. By S. P. Verner *noticed* 126
—— East, Protectorate. By Sir C. Eliot *noticed* 442
—— —— —— Farming in 602
—— —— —— Trade in 159
—— Economic Future of 225
—— French. Trois colonisateurs. Par le capt. Froelicher *noticed*. 757
—— Geographical Reader. By Frank G. Carpenter *noticed* 760
—— Geographical Work in, 1904. 136
—— Lettres d'Afrique du Col. Baron Lahure *noticed* 318
—— Macmillan Expedition 417
—— Maj. Cotton's expedition 47
—— Mountain ascents by Dr. Uhlig 551
—— North. Nordafrikanische Touristfahrten. Von C. v. Zelau *noticed* 573
—— Promenades Lointaines. Par le lieut. Paulhiac *noticed* 763
—— Railroad, Cape to Cairo 294
—— —— Progress 416
—— Railroads. Chemins de Fer coloniaux en Afrique, E. de Renty *noticed* 511, 758
—— —— Growth of 138
—— Salt in 290
—— South. Aus Süd-west-Afrika *noticed* 318
—— —— British Association Meeting 224, 491, 552, 732
—— —— Das Neue Südafrika. Von Paul Samassa *noticed* 756
—— —— From the Cape to the Zambesi. By G. T. Hutchinson *noticed* 700
—— —— Guide to *noticed* 177
—— —— Mines de l'Afrique du Sud. Par A. Bordeaux *noticed*. 128

PAGE
Africa, South, Mission, Die . . . . Deutsch-Südwestafrika. Von P. Carl Paul *noticed* 192
—— —— Prospects of. By O. Thomas *noticed* 308
—— —— Surveys 416
—— —— Zukunft Deutsch-Sudwestafrikas. G. Hartmann *noticed* 318
—— West, and Other Addresses by E. W. Blyden *noticed* 762
—— —— L'Ouest Africain et les Missions Catholiques . . . Par G. Renouard *noticed* 191
—— —— "Verb. Sap." By A. Field *noticed* 445
Agassiz, Alex. in the Eastern Pacific 165
Agricultural Experiment Stations in Alaska 223
Agriculture, West Indies 289
Aïn Sefra, Algeria, destroyed by flood 46
Aksai Chin, or White Desert 710
Alaska, Agricultural Experiment Stations 223
—— Boundary Survey 733
—— Copper River Basin, Parties sent to, 1902 35
—— Glacial retreat 552
—— Gold first discovered by Doroshin 28
—— —— found, Stikine River, 1865 28
—— —— output, Seward Penin. . 33
—— —— quartz found, Sitka, 1879 30
—— Juneau placers 30
—— Mineral resources, 1904 549
—— Mineral Resources, Division (U. S. Geol. Survey) 37
—— Mineral Wealth, Investigation of. By Alfred H. Brooks. 26
—— Mountaineering in 468
—— Northern. Explorations, 1901 34
—— Petroleum 37, 417
—— Porcupine Placer Dist. 548
—— Progress, 1904 132
—— Surveys, U. S. Geological, begun 1898 31
—— Yukon River placers 31, 35
Alaskan Range. By A. H. Brooks. 468
Albatross in the Eastern Pacific . . 165
Alberta, New Canadian Province, 419, 668

* In the map of Lago Titicaca on page 451 the latitudes should read, from top to bottom: 15, 16, 17.

PAGE

Alpine summit levels, Accordance of ... 423
Alpinisme, Josias Simler et les Origines de. Par W. A. B. Coolidge *noticed* ... 568
Alps, Glacial Feature, Prof. Penck on ... 232
—— Sonnenwendgebirge im Unterinnthal. Von F. Wähner *noticed* ... 755
Amazon Basin, Rubber in the ... 143
America, North, Floristic Elements of ... 223
—— South, Commercial Traveller in. By F. Wiborg *noticed* ... 700
—— —— Durch die Urwälder Südamerikas. Von A. Perl *noticed* ... 123
—— —— Geographical Progress, 1904 ... 133
—— —— Südamerika und die deutschen Interessen. Von W. Sievers *noticed* ... 177
—— Tropic, Economic Importance of Plateaux in. By J. R. Smith. 461
—— West, Arid regions of ... 531
—— West, Pathfinders of the. By A. C. Laut *noticed* ... 253
American Cities, Geography of. By W. S. Tower ... 577
—— Geographers, Association of, 42, 84, 733
—— Geographical Society, Annual Address of the President .. 129
—— —— —— Annual Report ... 97
—— —— —— By-Laws ... 362
—— —— —— Charter ... 357
—— —— —— Charter, Amended 359
—— —— —— Fellows ... 369-382
—— —— —— Fiftieth Anniversary Dinner ... 41
—— —— —— Library Accessions ... 115, 243, 428, 622
—— —— —— Members, Honorary and Corresponding ... 368
—— —— —— Semi-Centennial .. 22
—— —— —— South Polar Chart published by ... 686
—— —— —— Transactions, 40, 97, 157, 222, 286
Americanists' Congress, 15th International ... 616
Amundsen, North Magnetic Pole Expedition ... 51, 561
Anderson, R. H ... 550
—— T., Expeditions to Stromboli. 162
Andes, Bolivian, Glaciers on Pacific slopes ... 454
—— Water power in the ... 605
Andree, Richard, Seventieth birthday ... 237
Andrew J. Stone Explorations, Arctic America *noticed* ... 502

PAGE

Animals, Wild, Photographing ... 588
Annandale, Nelson. The Faroes and Iceland *noticed* ... 765
Année Cartographique *noticed* ... 58
Annuaire Astronomique pour 1906 *noticed* ... 425
Antarctic, British Expedition, Results of ... 494
—— Charcot Expedition .. 234, 293, 675
—— Coats Land ... 95
—— Drygalski, "Zum Kontinent des Eisigen Südens." Review by E. S. Balch ... 544
—— Explorations, Summary by E. Pariset ... 105
—— Icebergs, Size of ... 739
—— Meteorological Stations, 166, 290, 613-614
—— Meteorology ... 96, 105, 106, 613
—— Nomenclature. By E. S. Balch ... 718
—— Polar Chart South. Published by Am. Geog. Soc ... 686
—— Polar Enterprise, International ... 674
—— "*Polar Times, South*" ... 235
—— Ross's reported sounding ... 95
—— *Scotia*, Meteorological record. 96
—— *Scotia*, Second Voyage of ... 94
—— Temperatures ... 167
—— Weddell Sea ... 96
—— Work in the, 1904 ... 140
[Anthropology.] Mensch, Der. Von A. Heilborn *noticed* ... 763
—— Mensch und Erde. Von A. Kirchhoff *noticed* ... 639
—— Menschheit, Das alter der wirtschaftlichen Kultur der. Von E. Hahn *noticed* ... 748
Appalachians, Great Roads Across the. By A. P. Brigham ... 321
Arabia, Penetration of. By D. G. Hogarth *noticed* ... 309
Arctic America, Andrew J. Stone Explorations *noticed* ... 502
—— Duc d'Orléans Expedition, 294, 493, 672
—— Exploring Vessels, Sale of .. 166
—— Parry Archipelago, Explorations west of ... 675
—— Peary, R. E. Departure from New York ... 481
—— —— —— Departure from North Sydney ... 594
—— —— —— Expedition, Preparations ... 171
—— —— —— "*Roosevelt*" launched ... 220
—— Polar Enterprise, International ... 674
—— Pole, to the, by balloon ... 675
—— Toll, Baron, Fate of ... 234
—— Work in the, 1904 ... 139

PAGE
Arctic. Ziegler Expedition, 171, 234, 612, 674
Argentina-Chile. Countries of the King's Award. By T. H. Holdich *noticed* 124
—— Railroad 607
Argentina, República. Baedeker de la. Por A. B. Martinez *noticed* 759
Argentine Observatory and Some Patagonian Lakes 284
Arid regions, Western America .. 531
Arizona, Salt River reclamation .. 4
—— Underground water survey. 8
Aros Cañon, Chihuahua 536
Asia, Central, Barrett's Expedition to 49
—— —— Cotton in 607
—— —— Lakes beside the Lower Tarim 78
—— East. Ostasiatische Skizzen. Von P. Gräfin Montgelas *noticed* 446
—— Geographical Progress, 1904. 135
—— Minor. Archäologische Expedition nach Kleinasien. J. Jüthner (et al.) *noticed* 507
—— —— Baedeker *noticed* 753
—— —— Maps of 610
—— Nutzbare Tiere Ostasiens. Von E. Brass *noticed* 506
—— Rubber, Para, in 671
Asmara, New Capital of Eritrea .. 46
Association of American Geographers 42, 84, 733
Astronomical Stations, Dr. Klotz's. 296
Atkinson, Fred. W. Philippine Islands *noticed* 757
Atlantic, Drift of a Bottle 235
—— North. Deeps and Shallows. 19
—— —— Floor of the. Sir John Murray 18
—— —— Glauconite deposits 20
—— —— Globigerina ooze 21
—— —— Phosphate deposits 20
—— —— Rock fragments from. 20
—— —— Temperature, Salinity and Currents 20
—— ports, Southern 579
—— water in the North Sea 104
Atlas, England and Wales, Bartholomew, *noticed* 56
—— Meyers *noticed* 620
—— Peip's Taschen *noticed* 303
—— Stieler's, Parts *noticed*, 114, 242, 303, 428, 621, 685
—— United States Geologic, Parts *noticed* 54, 110, 172, 240, 300, 426, 499, 566
—— Universel de Géographie, Parts *noticed* 242, 747
Atmosphere, Balloon study of 562

PAGE
Australasia, Climate of. By J. W. Gregory *noticed* 311
Australia, Cotton-growing in 230
[Australia] New Nation, The. By P. F. Rowland *noticed* 180
—— Newspaper weather map 49
Australian Handbook, 1905, *noticed* 255
Austria, Cave at Markovsina 420
Austria-Hungary. Orts-Lexikon von Österreich-Ungarn, von K. Peucker *noticed* 306
Aves Island annexed by Great Britain 157
Baedeker, France, Northern *noticed* 317
—— Griechenland *noticed* 126
—— Konstantinopel u. das Westliche Kleinasien *noticed* 753
—— London and Environs *noticed* 311
—— Paris and Environs *noticed*. 308
Bagdad Railroad 229
Bain, H. F. 678
Balch, Edwin Swift. Antarctic Nomenclature 718
—— —— —— Drygalski's "Zum Kontinent des Eisigen Südens" reviewed 544
Baltimore and Vicinity, Climate, &c., of. By O. L. Fassig *noticed* 316
Baluchi, nomads, Sistan 277
Bananas, Colombia 295
Bandar Sudan, New Red Sea Port, 107, 159
Bandelier, A. F. The Basin of Lake Titicaca 449
Barois, J. Irrigations en Egypte *noticed* 762
Barometric readings on the *Roosevelt* (table) 600
Barrett, Robert L., Expedition to Central Asia 49
Bastian, Adolf. Obituary 298
Bavaria, Electric Power for 738
Beccari, Odoardo. Wanderings, . . . Forests of Borneo *noticed* .. 255
Belle Fourche (S. Dakota). Reclamation project 8
Ben Nevis, Rainfall 232, 672
—— —— Temperature 611
Bentheim, Otto von, und and. Handbuch der Heidekultur *noticed* 754
Bering River coal deposits 417
Berlin, Gesellschaft für Erdkunde. Richthofen Memorial Meeting. 743
Bibliography. Bibliotheca Geographica, 1901 *noticed* 614
—— Cirques 91
—— Deutschen Landeskunde. Vol. II, Kirchhoff und Regel *noticed*. 448

PAGE
Bibliography. Geology..167, 549, 677
—— Lithuania 615
—— Underground Waters........ 419
Biological Evidence of River Capture. By D. W. Johnson. *Abstract* 154
—— Laboratory, Marine, at Tortugas 158
—— Station, Murman Coast.... 50
Bird Migration in Europe....... 610
Blanchard, C. J. United States Reclamation Service............ 1
Blanford, Wm. Thomas. Obituary 689
Blyden, Edw. Wilmot. West Africa before Europe *noticed*.. 762
Boas, Franz, resigns............. 563
Bockelmann, Albrecht von. Wirtschaftsgeographie von Niederl. Ost-Indien *noticed*............ 383
Boehm, Edgar C. Persian Gulf and the South Sea Isles *noticed*. 122
Bokhara, Vocabulary of Tongues.. 229
Bolivia, Northern. Nordenskjöld's work in...................... 736
—— Railroads 607
Bonaparte, Roland (et al.), Le Mexique *noticed*............... 502
Bontoc Igorot. By A. E. Jenks *noticed* 575
Book Notices....58, 122, 177, 251, 304, 383, 436, 502, 568, 629, 692, 748
Boone's Trail (Wilderness Road) 338
Bordeaux, Albert. Les Mines de l'Afrique du Sud *noticed*...... 128
Borneo, Great Forests of. By O. Beccari *noticed*................ 255
Brass, Emil. Nutzbare Tiere Ostasiens *noticed* 506
Brigham, Albert Perry. Great Roads Across the Appalachians 321
—— —— —— Student's Laboratory Manual of Physical Geography *noticed*................ 62
—— —— —— Travels 678
British Association, South African Meeting....224, 491, 552, 732
—— Coal resources.............. 162
—— Colonies, Lantern Lectures for the 53
—— Columbia, Mineral Products, 1904 669
—— Isles, Geography in the.... 53
Brooks, Alfred H. Alaskan Range 468
—— —— —— Alaska's Mineral Wealth, Investigation of.....26, 549
Brown, Chas. W................ 678
—— Robert M. Cirques: A Review 86
Bryant, Henry G. Remarks at the A. G. S. Semi-Centennial.. 26
Burmans, Among the. By H. P. Cochrane *noticed*.............. 444
Cable to Celebes................ 492

PAGE
Cable to Iceland................ 612
Cadalso, A. R. on the Map of Cuba 605
Caix, Robert de. Terre-Neuve, Saint-Pierre et le French Shore *noticed* 181
California. Maidu Indians...... 553
—— reclamation projects......... 9
Canada As It Is. By J. F. Fraser *noticed* 700
—— Geographic Board........... 224
—— Geological Survey........... 133
—— Life in. By T. Conant *noticed* 177
—— Mineral Production, 1904... 297
—— New Provinces..........419, 668
—— Railroad, Second Trans-continental 224
Canadian Rocky Mts., Heights in. 102
Canals, Great, of the World.... 235
Cape Colony, Geology of. By A. W. Rogers *noticed*............ 753
—— —— Irrigation 601
—— —— Ostriches 665
Carnegie Institution. Explorations in Turkestan *noticed*.......... 751
Carpenter, Frank G. Africa, Geographical Reader *noticed*...... 760
Catalogue of Scientific Literature, International *noticed*........... 316
Cataloguing Maps. By Thomas Letts 485
Caucasus, Western, Glaciers of.. 738
Cave exploration, Recent........ 671
Caverns, Influence of, on Topography 107
[Cayenne] Choiseul und die Katastrophe am Korouflusse, von W. Marcus *noticed*............ 317
Celebes, Cable connection........ 492
Census. Africa, British South.... 49
Centenary of Don Quixote...... 496
Chad. La Grande Route du Tchad. Par E. A. Lenfant *noticed* 383
Chaix, Emile. Notes d'Analyse Géographique *noticed*.......... 758
Chamberlin, T. C. 614
Chambers, Frank Taylor. American Samoa................... 641
Charcot Antarctic Expedition, 234, 293, 675
Charron, Paul. Obituary........ 743
Chihuahua. Corralitos River..... 532
—— Lake Guzman.............. 532
—— Mesa Venado.............. 538
—— Mexico, Western Sierra Madre of. By E. O. Hovey...... 531
—— Rio de Mayo cañon......... 539
—— Sabinal Mountains.......... 533
—— San Miguel River......532-533
—— Yaqui (Aros) River Cañon. 536

PAGE

[Chile-Argentina] Countries of the King's Award by T. H. Holdich *noticed* 124
Chile-Argentina Railroad 607
Chile, Meteorology 606
—— Rainfall, 1903 289
—— Republic of. By M. R. Wright *noticed* 189
Chilovi, Desiderio. Obituary 497
China, Central, Railroad projects. 560
—— Commercial, 1904 51
—— Dans les Rapides du Fleuve Bleu. Par le Lieut. Hourst *noticed* 180
—— Distance Table from Diary of F. H. Nichols 355
—— East, Bailey Willis's work in 160
—— Nichols, F. H., Diary in 339
—— Stock-raising in 561
—— Ten Chief Ports of, in 1903. 229
—— Trade, Foreign, 1903 228
—— und Tibet, An den Grenzen von, H. Hackmann *noticed* 505
Chinese Map of the World 171
Cirques: A Review. By R. M. Brown 86
—— Bibliography 91
—— Glacial Origin of 167
—— River Amphitheatres and ... 89
—— Special features 90
—— Theories of 87-89
Clement, Ernest W. Christianity in Modern Japan *noticed* 754
Clifford, Hugh. Further India *noticed* 123
Climate and Deforestation 495
—— Tibet 229
—— Titicaca 453
—— Turkestan 608
Climatic Zones and Their Subdivisions. By R. DeC. Ward .. 385
Climatology, Cyclonic Element in. 169
Club Alpin Français, New publication of the 164
—— Explorer's 740
Coal, Bering River deposits 417
—— Resources, United Kingdom. 162
Coast and Geodetic Survey, U. S. Annual Report 1904 559
Coats Land, Antarctic 95
Cobham, C. D., and Hutchinson, J. T. Handbook of Cyprus *noticed* 759
Cochrane, Henry P. Among the Burmans *noticed* 444
Coffee, Queensland 295
Colombia, Bananas 295
Colonies, German 235
—— —— Adressbuch, 1905 *noticed* 422
—— —— Handbuch, R. Fitzner *noticed* 444
Colorado, Reclamation projects ... 6, 9

PAGE

Çomâlis, Les. Par G. Ferrand *noticed* 307
Commerce, British East Africa Protectorate 159
—— Kaiser Wilhelm Canal 106
—— Lectures on. By H. R. Hatfield *noticed* 702
—— Ocean. Organization of. By J. R. Smith *noticed* 574
—— Swedish, 1903 163
Conant, Thomas. Life in Canada *noticed* 177
Conard, H. S. Olympic Peninsula 557
Congo Cataracts, Highest Point on Railroad 294
—— Free State, Story of. By H. W. Wack *noticed* 187
—— French, Gorilla 667
—— Kongostaat, Der. Von K. Freih. v. Stengel *noticed* 192
—— Rubber-planting on the 159
—— Telegraph 666
—— Temperatures, Sensible 291
—— The. By Roland de Marès *noticed* 127
Congress, Americanists, 15th International 616
—— Geographic, German, 15th Session 238
—— —— German, 15th Session. By A. Wolkenhauer 653
—— —— International Committee 677
—— —— International, Report of the Eighth *noticed* 739
—— Geological, Tenth International 677
Constantza, Commerce of 164
Controller Bay, Alaska. Coal near 37
Conventions, Weather Bureau 555
Cook, Theo. Andrea. Old Provence *noticed* 761
Coolidge, W. A. B. Josias Simler et les Origines de l'Alpinisme *noticed* 568
Copper, Katanga 666
Copper River Basin (Alaska), Parties sent to, 1902 35
Cora, Guido 614
Corralitos River, Chihuahua 532
Cotton, Australia 230
—— Central Asia 607
—— Die Baumwolle . . . Von A. Oppel *noticed* 508
—— Extended culture 296
—— Sudan and Nigeria 225
Coyote, D. E. Lantz on the 740
Crosby, Oscar T. From Tiflis to Tibet 703
Crosthwait, H. L. Patagonian journey 284
Cuba, Map of. A. R. Cadalso 605
—— Meteorological Journal 102

PAGE
Currents, Nova Scotia........... 419
Cyclonic Element in Climatology. 169
Cyprus, Handbook of. By J. T. Hutchinson and C. D. Cobham 759
Dale, T. N..................... 549
Dalmatien und Montenegro. Von L. Passarge *noticed*............ 441
Darling, Frank W. Laboratory Manual in Physical Geography *noticed* 761
Darton, N. H. Underground Water Resources of the Great Plains *noticed*.................. 554
Dar-Ul-Islam. By Mark Sykes *noticed* 639
Davis, W. M................... 751
—— —— Account of the Brit. Association Meeting in S. Africa.. 732
—— —— Opportunity for the Association of American Geographers 84
Dawson, Samuel E. The St. Lawrence *noticed*................. 632
Day, Clive. Policy and Administration of the Dutch in Java *noticed* 128
Deecke, W. Italy *noticed*....... 633
—— —— Letter from........... 732
"Deeps," N. Atlantic Ocean..... 19
Deforestation and Climate....... 495
Dehn, Paul. Weltwirtschaftliche Neubildungen *noticed*.......... 251
Demangeon, Albert. La Picardie et les Régions voisines *noticed*.. 447
Denmark. Dänemarks Natur und Volk von E. Löffler *noticed*.... 446
Depression of Sistan in Eastern Persia. By E. Huntington.... 271
Derbyshire, Highways and Byways in. By J. B. Firth *noticed* 446
Desideri. Viaggio . . . Tibet. Por C. Puini *noticed*.............. 438
Diary of the late Francis H. Nichols in China.................. 339
Diccionario Sipibo von K. von den Steinen *noticed*............... 503
Diego Alvarez or Gough Island. 615
Disco Scientific Station.......... 420
Discovery Antarctic Expedition, Results of 494
—— sold 166
Dodge, Richard E. Advanced Geography *noticed*............. 123
Dodwell, A. Olympic Peninsula.. 557
Douglas, Robert K. Europe and the Far East *noticed*........... 179
Doumer, Paul. L'Indo-Chine française *noticed*.................. 507
Drift casks in the Arctic........ 738
Dryer, Charles R. Finger Lakes. 101
Drygalski, E. von. Zum Kontinent des Eisigen Südens. Review by E. S. Balch 544

PAGE
Dunes, Tarim Lakes 83
Dwight, Henry O. Blue Book of Missions 1905 *noticed*.......... 320
Earthquakes. Handbuch der Erdbebenkunde von A. Sieberg *noticed* 305
—— in Japan..................... 216
Eastern Bengal and Assam, New Province, India................ 670
[East India Company, Dutch] Uit der Dagen der Compagnie, N. P. Van Den Berg *noticed*...... 253
East Indies, Dutch. Wirtschaftsgeographie von Niederl. Ost-Indien, A. von Bockelmann *noticed* 383
Economic Importance of the Plateaux in Tropic America. By J. R. Smith................... 461
Ecuador. Measurement of a degree 606
Edgerton, Hugh E. Origin and Growth of the English Colonies *noticed* 309
Edwards, Wm. S. Into the Yukon *noticed*.................... 308
Egypt. Beschreibung Ägyptens im Mittelalter . . . . von E. Reitemeyer *noticed*............... 178
—— Irrigations en Egypte. Par J. Barois *noticed*.............. 762
Eliot, Sir Chas. East Africa Protectorate *noticed*............... 442
Elisha Kent Kane Medal........ 424
Emigration, Italian.............. 161
Engineering, American. Manual of Instruments used *noticed*.... 762
England. Devonport Dockyard.. 232
—— Fogs, effect on commerce.... 231
—— Rainfall and wheat......... 231
—— und die Engländer. Von Carl Peters *noticed*............ 125
—— Colonies, Origin and Growth of. By H. E. Edgerton *noticed*. 309
[Entomology.] Souvenirs Entomologiques. Par J. H. Fabre *noticed* 445
Erdkunde, Geschichte der. Von S. Günther, 1. Teil *noticed*...... 181
Erichsen, L. M. Proposed trip to East Greenland................ 554
Erie Canal begun............... 328
Eritrea, La Colonizzazione Agricola dell', G. B. Gioli *noticed*.. 192
—— New Capital of............ 46
Eskimo immigration into Greenland 673
—— snow huts.................. 674
Ethiopia in Exile. By B. Pullen-Burry *noticed*................. 702
Europe and the Far East. By R. K. Douglas *noticed*............ 179
—— Bird migration............. 610
—— Geographical Progress, 1904. 134

PAGE
Europe, Guide. By E. C. and T. L. Stedman *noticed* 442
—— Karst, rainfall 162
—— Northern. Fish, Catalogue of 104
Evaporation in the United States .. 286
Everest, Mount, Photograph of ... 480
Explorers' Club 740
Fabre, J. Henri. Souvenirs Entomologiques *noticed* 445
Falkland Islands and South Orkneys, Channel between 96
Falls, Victoria 103
Farming, British East Africa 602
Faroes and Iceland. By N. Annandale *noticed* 765
Farrar, Reginald J. Garden of Asia *noticed* 254
Fassig, Oliver L. Climate and Weather of Baltimore *noticed* .. 316
Feldmann, Hermann. Die ärtzliche Mission unter Heiden und Mohammedanern *noticed* 763
Ferrand, Gabriel. Les Çomâlis *noticed* 307
Fiala Expedition, Relief of 171
Field, Alan. "Verb. Sap." on going to West Africa *noticed* .. 445
Figueroa, F. de. Misiones . . . en el País de los Maynas *noticed* .. 443
Fiji, Tales from Old. By L. Fison *noticed* 512
—— Tornado near 422
Findelen Barley and Rye 421
Finger Lake Region, Western New York 101, 195
Fiords of Norway, Depths of 104
Firth, J. B. Highways and Byways in Derbyshire *noticed* 446
Fish of North Europe, Catalogue of 104
Fish, Transplanting 563
Fishery, Seal, 1904 107
Fison, Lorimer. Tales from Old Fiji *noticed* 512
Fitzner, Rudolf. Deutsches Kolonial-Handbuch *noticed* 444
Floor of the North Atlantic, Sir John Murray 18
Flora, Islands south of New Zealand 422
Floristic Elements of Eastern North America 223
Flour de Saint-Genis. La Propriété rurale en France *noticed*. 63
Fogs, London 50
Forestry, Primer of. By G. Pinchot *noticed* 418, 699
Fornes, C. V., speaks at the A. G. S. Semi-Centennial 23
Fossils, Marine, in the Sahara 21
Foureau's Map of Trans-Saharan Journey 47

France, Northern. Baedeker *noticed* 317
—— La Propriété rurale en. Par Flour de Saint-Genis *noticed* .. 63
Fraser, John Foster. Canada As It Is *noticed* 700
Free Zone, Mexico 288
—— —— —— abolished 670
Freiderichsen, Max. Forschungsreise in den Tien-schan, &c. *noticed* 60
Friedrich, Ernst. Allgemeine und Spezielle Wirtschaftsgeog. *noticed* 252
Frœlicher, Capt. Trois colonisateurs *noticed* 757
Fulani Rulers, Northern Nigeria .. 48
Fuller, M. L. Deep Well Drilling *noticed* 550
Fulton's Steamboat Centennial ... 739
Gannett, Henry. Early Western Explorers and the Railroads ... 716
—— —— Philippine Census 257
—— S. S. Geographic Tables .. 548
Garden of Asia. By R. G. Farrar *noticed* 254
Garstin, Sir Wm. Report upon Basin of the Upper Nile *noticed*. 313
Gauss Antarctic voyage reviewed 544
Gauthiot, Charles. Obituary 238
Gazetteer. Orts-Lexikon von Österreich-Ungarn von K. Peucker *noticed* 306
Geere, H. Valentine. By Nile and Euphrates *noticed* 189
Geikie, Sir Archibald. Landscape in History *noticed* 446
Genesee Road, N. Y. State 326
Geographers, American, Association of 42, 84, 733
Geographic Board of Canada, Fifth Report 224
—— Congress, German 238, 653
—— —— International Committee 677
—— —— International Report, Eighth, *noticed* 739
—— Names, Philippine Committee on 608
—— —— U. S. Board on, 108, 298, 670, 742
Geographical Record..40, 97, 157, 222, 286, 416, 490, 551, 601, 665, 732
—— Work of the World in 1904. R. E. Peary 129
Geography. Ausgewählte Stücke . . . . von O. Krümmel *noticed*. 312
—— Commercial, of the World. By A. J. Herbertson *noticed* 312
—— Dodge's Advanced *noticed* .. 123
—— Economic. Allgemeine und Spezielle Wirtschaftsgeog. Von E. Friedrich *noticed* 252

PAGE

Geography. Home, Excursions and Lessons. By C. A. McMurry *noticed.* ... 61
—— in Oxford, 1904 ... 297
—— in the United Kingdom ... 53
—— Lehrbuch der Geographie. Von H. Wagner *noticed* ... 182
—— New York City Schools ... 742
—— Notes d'analyse Géographique. Par E. Chaix *noticed* ... 758
—— of American Cities. By W. S. Tower ... 577
—— Physical, Laboratory and Field Exercises in. By G. H. Trafton *noticed* ... 760
—— —— Laboratory Manual in. By F. W. Darling *noticed* ... 761
—— —— Students' Laboratory Manual. By A. P. Brigham *noticed* ... 62
—— Practical, in America ... 101
—— Text-books compared ... 741
—— Württembergischen Vereins . . . , Jahresbericht *noticed* ... 570
Geologic Atlas, U. S. *noticed* 54, 110, 172, 240, 300, 426, 499, 566
—— Expression in Contour Maps. 107
Geological Congress, Tenth International ... 677
—— Survey, Canadian ... 133
—— —— U. S. Publications *noticed*, 240, 287, 417, 419, 548-550, 554, 557, 677, 765
Geology, Bibliography ... 167, 549, 677
—— Cape Colony. By A. W. Rogers *noticed* ... 753
—— Metamorphism ... 550
German Colonies ... 235
—— —— Adressbuch, 1905 *noticed* ... 422
—— —— Handbuch. R. Fitzner *noticed* ... 444
—— Geographical Congress .. 238, 653
Germany. Entwicklung des deutschen Wirtschaftslebens . . . Von L. Pohle *noticed* ... 126
—— Heath lands. Handbuch der Heidekultur *noticed* ... 754
Gilbert, G. K. Gift to Denison University ... 742
—— —— honored ... 54
Gioli, G. Bartolommei. La Colonizzazione Agricola dell' Eritrea *noticed* ... 192
Glacial Feature, Alps ... 232
—— History of Hudson-Champlain Valleys ... 42
—— Lake Iroquois Beach ... 158
—— origin of Cirques ... 167
—— Period, Tian Shan ... 521
Glaciation, Transvaal ... 416
Glaciers, Alaska, Retreat of ... 552
—— and Glaciation, Tian Shan. 518
Glaciers, Bolivian Andes ... 454
—— Effect of Debris on ... 168
—— Western Caucasus ... 738
Glasser, M. E. Richesses Minérales, Nouv.-Calédonie *noticed* ... 253
Glauconite deposits, N. Atlantic. 20
Globigerina ooze, North Atlantic .. 21
Globus Andree number ... 237
Gold, Witwatersrand, Origin of. 226
Goldie, Geo. D. T., elected President, R. G. S. ... 563
Gorges and Waterfalls of Central New York, by R. S. Tarr ... 193
Gorilla, French Congo ... 667
Gough Island (Diego Alvarez) .. 615
Graebner, Paul. Handbuch der Heidekultur *noticed* ... 754
Grain ripened, 7,000 ft. above sea-level ... 421
Great Lakes, Meteorology of, 1904. 289
—— Plains, Underground water .. 554
Greece, Baedeker, German edition *noticed* ... 126
Greenland. Disco Scientific Station ... 421
—— East. L. M. Erichsen to explore ... 554
Gregory, J. W. Climate of Australasia *noticed* ... 311
—— —— Geography of Victoria *noticed* ... 312
—— R. A. Huxley's Physiography revised *noticed* ... 61
Greytown, Nicaragua, Harbour conditions ... 76
Grinten, Van der, Circular Projection. By G. W. Littlehales ... 14
Guam, Useful Plants of ... 411
Guayaquil and Quito Railroad ... 736
Guide, Africa, South *noticed* 177
—— Argentina *noticed* ... 759
—— Australia *noticed* ... 255
—— Cyprus *noticed* ... 759
—— Europe *noticed* ... 442
—— France, Northern *noticed* ... 317
—— Griechenland *noticed* ... 126
—— Konstantinopel, &c. *noticed* .. 753
—— London and Environs *noticed* 311
—— Mediterranean *noticed* ... 254
—— Paris and Environs *noticed.* 308
—— Traveler's Handbook. By J. Tozier *noticed* ... 572
—— Türkei, Rumänien, &c. *noticed* ... 572
Guinea Current observations ... 53
Gulf ports ... 580
Günther, Siegmund. Geschichte der Erdkunde, 1. Teil *noticed.* 181
Gutierrez de Santa Clara, Pedro. Historia de las Guerras Civiles del Peru *noticed* ... 436, 692
Guzman, Lake, Chihuahua ... 532

PAGE
Hackmann, H. An den Grenzen von China und Tibet *noticed*.. 505
Hahn, Ed. Das Alter der wirtschaftlichen Kultur der Menschheit *noticed*.......... 748
Hall, Elial F. Obituary.......... 688
Hall, W. C.......... 550
Hanging Valleys.......... 423
—— —— Central New York.... 199
Hartleben, A. Kleines Statistisches Taschenbuch *noticed*.......... 313
Hartmann, Georg. Die Zukunft Deutsch-Südwestafrikas *noticed*. 318
Harvard Travellers' Club.......... 605
Hatfield, Henry Rand. Lectures on Commerce *noticed*.......... 702
Haupt, Lewis M. Menace to the New York Harbour Entrance.. 65
Hedin, Sven. Lakes beside the Lower Tarim.......... 78
Heilborn, Adolf. Der Mensch *noticed*.......... 763
Heilprin, Angelo. Tower of Pelée *noticed*.......... 504
—— —— Uniformity in Mountain Elevations.......... 726
Henequen, Queensland.......... 296
Herbertson, A. J. 614
—— —— Commercial Geography of the World *noticed*.......... 312
Hevea trees in the Amazon Basin, 143-145
Hicks, F. C. *Editor*. Hutchins' Description of Virginia, &c. *noticed*.......... 441
Hill, Robert T., in Mexico.......... 157
—— —— Origin of the W. I. Archipelago.......... 735
Hints to Teachers, by H. R. Mill. Supplement to.......... 616
Historic Highways of America. By A. B. Hulbert. Vols. 8-16 *noticed*.......... 637
Hobbs, W. H. Configuration of the Rock Floor of Greater New York *noticed*.......... 765
Hogarth, David G. Penetration of Arabia *noticed*.......... 309
Holdich, Thomas H. Countries of the King's Award *noticed*.......... 124
Hondo River, New Mexico. Reclamation Project.......... 6
Horter, John C. Cultivated Rubber.......... 720
Hoskins, Franklin E. and Libbey, W. Jordan Valley and Petra *noticed*.......... 573
Hourst, Lieut. Dans les Rapides du Fleuve Bleu *noticed*.......... 180
Hovey, Edmund Otis, in Mexico. 157
—— —— —— Western Sierra Madre of Chihuahua, Mexico.. 531
Hoyt, J. C.......... 550
Hubbard, G. D.......... 562
—— Leonidas. Labrador Expedition *noticed*.......... 190
Hudson Bay and Northward (Low Expedition).......... 408
—— Champlain Valleys, Glacial History.......... 42
—— River, Submarine Cañon of. J. W. Spencer on.......... 100
—— Valley, Geology of.......... 549
Hulbert, Archer Butler. Historic Highways of America. Vols. 8-16 *noticed*.......... 637
—— H. B. The Island of Quelpart.......... 396
Huntington, Ellsworth.......... 752
—— —— Depression of Sistan in Eastern Persia.......... 271
—— —— Mountains and Kibitkas of Tian Shan.......... 513
—— —— to go to Asia.......... 49
Hutchins, Thomas. Topographical Description of Virginia, &c. Reprint *noticed*.......... 441
Hutchinson, G. T. From the Cape to the Zambesi *noticed*.......... 759
—— Sir J. T., and Cobham, C. D. Handbook of Cyprus *noticed*.. 759
Huxley, T. H. Physiography, revised R. A. Gregory *noticed*.... 61
Hydraulic power, Andes.......... 605
Hydraulics. Essais d'Hydraulique Souterraine et Fluviale. Par E. Maillet *noticed*.......... 762
Hydrographic Office, U. S., New Pilot Charts to be published... 165
Icebergs, Antarctic, Size of.......... 739
Iceland, Cable to.......... 612
—— Survey of.......... 233
—— The Faroes and. By N. Annandale *noticed*.......... 765
—— Vatna Jökull explored.......... 163
Idaho, Reclamation projects.......... 6, 9
India, Actual. By A. Sawtell *noticed*.......... 306
—— and Adjacent Countries, Map of.......... 161
—— Buddhist. By T. W. Rhys-Davids *noticed*.......... 320
—— Further. By Hugh Clifford *noticed*.......... 123
—— In Famine Land. By J. E. Scott *noticed*.......... 383
—— Mediæval, S. Lane-Poole *noticed*.......... 320
—— Meteorology.......... 609
—— New Province of.......... 670
—— Vedic. By Z. Ragozin *noticed*.......... 319
Indiana, Mineral wealth.......... 604
Indo-Chine française, L'. Par P. Doumer *noticed*.......... 507
International Polar Enterprise... 674

PAGE
Ireland, Alleyne. Far Eastern Tropics *noticed* 439
Irrigation, Cape Colony......... 601
—— Sistan 275
—— United States, 1902........ 99
Iron Island, Queensland coast...737
Iroquois Beach, Ontario......... 158
Issik Kul Lake, Turkestan........ 527
Italian Lakes, Post-glacial changes 104
Italy. By W. Deecke *noticed*.... 633
—— By W. Deecke. Letter from the author 732
—— Emigration and population.. 161
Jalla, Adolphe. Pionniers parmi les Ma-Rotse *noticed*.......... 192
(Jamaica) Ethiopia in Exile. By B. Pullen-Burry *noticed*....... 702
Japan, Christianity in Modern. By E. W. Clement *noticed*...... 754
—— Commercial, 1904.......... 52
—— Earthquakes in............. 216
—— Garden of Asia, by R. J. Farrar *noticed*................ 254
—— in the Beginning of the 20th Century *noticed*.............. 179
—— Land of the Rising Sun. By G. de Wollant *noticed*........ 756
—— Seaweed Industries......... 736
—— und die Japaner von C. Munzinger *noticed*............ 506
—— Von J. J. Rein, Band I *noticed* 695
Japaner und ihre wirtschaftliche Entwickelung. Von K. Rathgen *noticed*.................. 506
Java, Policy . . of the Dutch in. By C. Day *noticed*........... 128
Jenks, Albert E. Bontoc Igorot *noticed* 575
Johns Hopkins University, Maryland Geology................. 553
Johnson, Douglas Wilson. Biological Evidence of River Capture. *Abstract*................ 154
—— —— —— Youth, Maturity, and Old Age of Topographic Forms 648
—— W. H. Cultivation and Preparation of Para Rubber *noticed* 255
Johnston, Sir Harry, in Liberia.. 603
Jordan Valley and Petra. By W. Libbey and F. E. Hoskins *noticed* 573
Joûbert, Joseph. Stanley, le Roi des Explorateurs *noticed*....... 572
Journal of Geography, Editorship of 54
Juneau placers, Gold found, 1880 30
Jungle Trails and Jungle People. By C. Whitney *noticed*........ 699
Jüthner J. (et al.) Archäologische Expedition nach Kleinasien *noticed*................. 507

PAGE
Kahn, Albert. Fund for French Students' travel................ 297
Kaiser Wilhelm Canal, Traffic of. 106
Kane Medal...................... 424
Kaneko, Baron. Remarks at the A. G. S. Semi-Centennial...... 25
Karakash River, Source of...... 710
Katanga, Copper 666
Kaukasus zum Mittelmeer. Von P. Rohrbach *noticed*........... 62
Kern County, Cal. Mountain breezes 44
Khan, Hadji, and Sparroy, Wilfred. With the Pilgrims to Mecca *noticed*................ 317
Khartum, Rebuilding of......... 45
Khotan, Precious MSS. from..... 705
Kibitkas of Tian Shan. By E. Huntington 513
Kirchhoff, Alfred. Mensch und Erde *noticed*.................. 639
—— —— und Regel, F. Literatur zur d. Landeskunde. Vol. II *noticed* 448
Kirghiz, Dress of............... 516
—— Migrations of 515
—— Pasture-ground, Son Kul... 518
Klamath River (Cal.) reclamation project.................. 9
Klondike gold-placers, 1896...... 31
Klotz, Otto, Astronomical Stations 296
Kolonial Handels-Adressbuch, 1905 *noticed* 422
Korea, Commercial, 1904........ 51
Krümmel, O. Ausgewählte Stücke . . der Geographie *noticed*.... 312
Kund, Richard. Obituary...... 54
Labrador Wild, Lure of the. By D. Wallace *noticed*............ 190
Lahontan, Baron de. New Voyages to N. America. *Reprint*, R. G. Thwaites *noticed*....... 576
Lahure, Baron. Lettres d'Afrique *noticed* 318
Lake Rukwa shrinking........... 225
—— Titicaca, Basin of. By A. F. Bandelier.................. 449
Lakes, Italian, Post-glacial changes 104
—— Patagonian 284
Land of the Rising Sun. By G. de Wollant *noticed*........... 756
Landon, Percival. Opening of Tibet *noticed*................. 184
Landscape in History. By Sir A. Geikie *noticed*................ 446
Lane-Poole, Stanley. Mediæval India *noticed*................. 320
Lantz, D. E. On the Coyote..... 740
Las Vegas (New Mexico), Reclamation surveys................ 12
Latitude Circles classified........ 385
Launching the "Roosevelt"...... 220

PAGE
Laut, A. C. Pathfinders of the West *noticed* 253
Leclercq, Jules. Une Croisière au Spitzberg *noticed* 181
Lemaire returns from Africa 666
Lenfant, E. A. La Grande Route du Tchad *noticed* 383
Letts, Thomas. Maps: Handling, Classification and Cataloguing. 485
Levasseur, E. 425
Lewis, J. V. Triassic Traps, N. J. 562
Libbey Circle in Seismology 677
—— William, and F. E. Hoskins. Jordan Valley and Petra *noticed* 573
Liberia, Sir H. Johnston's observations 603
—— Travel in 48
Library, Accessions to the, 115, 243, 428, 622
Libysche Wüste zur Amonsoase. Von G. Steindorff *noticed* 317
Linde, Richard. Die Lüneburger Heide *noticed* 125
Lithuania, Bibliography of 615
Littlehales, G. W. Terrestrial Magnetic Work of the U. S. Coast and Geodetic Survey 281
—— —— Van der Grinten's Circular Projection 14
Live Stock in the Philippines 228
Löffler, E. Dänemarks Natur und Volk *noticed* 446
London and Environs. Baedeker *noticed* 311
—— Fogs 50
Long-range Weather Forecasts 238
Loplik, *people from Lop*, Central Asia 81
Lorenz, D. E. Mediterranean Traveller *noticed* 254
Loth, Gaston. Le Peuplement Italien en Tunisie et en Algérie *noticed* 384
Louisiana, Terrestrial Magnetism in 734
—— Tide-gauge work in 735
—— Underground Waters 734
Low, A. P. Expedition to Hudson Bay 408
—— Seth. Remarks at the A. G. S. Semi-Centennial 24
Lüneburger Heide, Die. Von R. Linde *noticed* 125
Lynch, Jeremiah. Three Years in the Klondike, French Translation 425
Lyons, H. G. Rains, Nile Basin .. 601
McGee, W. J. 678
Mackinder, H. J. 614
Macmillan Expedition 417
McMurry, Chas. A. Excursions and Lessons in Home Geography *noticed* 61

PAGE
Madan, A. C. Outline Dictionary of Bantu *noticed* 761
Magnetic Survey, North Pacific .. 675
Mahan, A. T. Remarks at the A. G. S. Semi-Centennial 24
Maidu, "Digger" Indians 553
Maillet, E. Essais d'Hydraulique Souterraine et Fluviale *noticed* 762
Mallen, Bernardo. Mexico Yesterday and To-day *noticed* 312
Manchuria. Per la Manciuria à Pechino, S. Minocchi *noticed* ... 256
Mangels, H. Abhandlungen aus Paraguay *noticed* 447
Mangrove bark in tanning 227
Manhattan Island, Origin of surrounding channels 735
Map, United States, on a scale of 1:1,000,000 730
—— World, Chinese 171
Maps, Asia Minor, Need of 610
—— Contour, Geologic Expression in 107
—— Educational, Oxford Geog. Inst. 501
—— Elemente der Terrainlehre des Kartenlesens und Croquierens *noticed* 181
—— Handling, Classification, Cataloguing. By Thomas Letts 485
Maps *noticed*, 54, 110, 172, 239, 425, 497, 564, 616, 678, 743

—— —— Africa:
—— —— —— Abyssinia, Lake Tsana 302
—— —— —— Abyssinia, McMillan's route 239
—— —— —— Congo Free State, Bartholomew's 301
—— —— —— East, Commercial. 679
—— —— —— " German, 239, 564
—— —— —— " Kilwa - Kisiwani 679
—— —— —— " Railroad 679
—— —— —— Galla Lands 744
—— —— —— German work in. 678
—— —— —— Liberia 617
—— —— —— Limpopo River ... 112
—— —— —— Madagascar, Railroad 112
—— —— —— Madagascar, Schrader's 747
—— —— —— Missions Catholiques 425
—— —— —— Monrovia, Brit. War Office 497
—— —— —— Nigeria-Kamerun. 565
—— —— —— Nile (Bahr el Gebel) 302
—— —— —— Nile, Fourtau's ... 564
—— —— —— " 4 maps, W. Willcocks 301

PAGE

Maps *noticed*, AFRICA: Northeast. 616

—— —— —— Orographical, Stanford's 743

—— —— —— Railroad and Route 57

—— —— —— Railroad and Steam Navigation............ 112

—— —— —— Rhodesia, Brit. S. A. Co. 498

—— —— —— Sahara, Figuig, Gauthier's 301

—— —— —— Sahara, Foureau's. 47

—— —— —— " Railroad and Telegraph............... 679

—— —— —— Sahara, Stieler's... 303

—— —— —— Stieler's..114, 621, 685

—— —— —— South [part of], Geologic 175

—— —— —— South, Railroad.. 176

—— —— —— Uganda, Anglo-German Boundary Commission. 744

—— —— —— Uganda, Owen's route 240

—— —— —— Uganda, Ripon Falls 239

—— —— —— West, Togo...... 57

—— —— —— " Togo, Station Atakpame................ 498

—— —— —— Witwatersrand Gold Fields.................. 176

—— —— —— Zambesi River... 498

—— —— —— Zululand, Geologic 617

—— —— AMERICA:

—— —— —— Alaska, Fairbanks and Birch Creek Dists......... 617

—— —— —— Alaska, Forty Mile Quadrangle.............. 617

—— —— —— Alaska, General Chart 425

—— —— —— Alaska, Juneau Special 173

—— —— —— Alaska, Petroleum Fields 426

—— —— —— Alaska, Porcupine Placer Dist.................. 55

—— —— —— Alaska, Reindeer Stations 426

—— —— —— Alaska, Seward Peninsula 618

—— —— —— Alaska, Yukon-Tanana Region............617, 618

—— —— —— Argentina, Córdoba 685

—— —— —— Argentina, J. J. Rohde 111

—— —— —— (Bolivia) La Paz, Plan 174

—— —— —— Bolivia, Steinmann Explorations............ 427

—— —— —— Canada, Alberta.. 679

—— —— —— " Manitoba. 679

Maps *noticed*, AMERICA: Canada, Montreal, Island and City..... 744

—— —— —— Canada, Netchakhoh, B. C.................... 111

—— —— —— New Brunswick, Ganong's 565-566

—— —— —— Canada, Northern 300

—— —— —— " Nova Scotia, Pictou Coal Field.......... 745

—— —— —— Canada, Ontario, Part of, Geological............ 745

—— —— —— Canada, Relief.... 300

—— —— —— " St. John, N. B., Tide Chart............ 426

—— —— —— Canada, St. Lawrence River 55

—— —— —— Canada, Saskatchewan 679, 680

—— —— —— Canada, Topographic (Hamilton Sheet)......... 565

—— —— —— Canada, Topographic (London Sheet).......... 300

—— —— —— Canada, Topographic (St. John Sheet).......... 679

—— —— —— Canada, Yukon Territory 565

—— —— —— Chile, Hydrographic Charts...111-112, 301, 566, 680

—— —— —— Cuba, Habenicht's 617

—— —— —— " *Soc. de Geog. de Lille* 499

—— —— —— Guiana, Dutch. Goninie Expedition............ 112

—— —— —— Mexico, Railroad. 500

—— —— —— Peru, Cajabamba. 241

—— —— —— " Cajatambo. 55

—— —— —— " Norte y Oriente. G. M. von Hassel.... 55

—— —— —— Porto Rico, Luquillo Forest Reserve.......... 173

—— —— —— South, German Explorations in 112

—— —— —— South, Stieler' [illegible]

—— —— —— United States

—— —— —— —— Alab[illegible]na, Hydrographic 55

—— —— —— —— Arizona, Bisbee geologic 54

—— —— —— —— Arkansas-Mo., Fayetteville geologic...... 300

—— —— —— —— Cascade Range, geologic................ 55

—— —— —— —— Central Great Plains 566

—— —— —— —— Colorado, Silverton geologic............. 426

—— —— —— —— Great Lakes, Meteorology Chart, 1904....... 289

—— —— —— —— Hudson Valley [part of] 173

—— —— —— —— Indian Terr.-Arkansas, Tahlequah geologic.. 680

PAGE

Maps *noticed*, AMERICA: United States, Kansas, Iola Quadrangle. 173
—— —— —— —— Montana [part of], Land Classification.. 54
—— —— —— —— Nevada, Geologic 618
—— —— —— —— New Hampshire, Forest and Land......... 240
—— —— —— —— New Jersey, Geologic 499
—— —— —— —— New Jersey, Topographic 499
—— —— —— —— New Mexico, Gila River Forest Reserve...... 300
—— —— —— —— New Mexico, Lincoln Forest Reserve.......... 54
—— —— —— —— North Carolina, Oyster Chart 426
—— —— —— —— North Carolina-Tenn., Asheville geologic. 172
—— —— —— —— North Dakota-Minn., Casselton-Fargo geologic 240
—— —— —— —— North Dakota, Western 300
—— —— —— —— Pennsylvania, Elders Ridge geologic.......... 499
—— —— —— —— Pennsylvania, Kittanning geologic............ 111
—— —— —— —— Pennsylvania, Rural Valley geologic.......... 566
—— —— —— —— Pennsylvania, Waynesburg geologic.......... 499
—— —— —— —— South Dakota, De Smet geologic 172
—— —— —— —— South Dakota, Huron geologic 110
—— —— —— —— Tennessee-N. Carolina, Greenville geologic 240
—— —— —— —— Washington (State), Rainfall.............. 240
—— —— —— —— Yellowstone Reserve................. 111
—— —— —— —— Bartholomew general.................. 680
—— —— —— [West Indies, Earthquake] 174

—— —— ASIA:
—— —— —— Afghanistan 681
—— —— —— Arabia, Bartholomew's 113
—— —— —— Central, Roborovski's Surveys.................. 745
—— —— —— China, Changsha Harbour 681
—— —— —— China, Chili Province 427
—— —— —— China, China Inland Mission.................. 746
—— —— —— China, Eastern... 681

PAGE

Maps *noticed*, ASIA: China, Hamilton's Journey 566
—— —— —— China, Hunan Province 681
—— —— —— China, Kiukiang, Plan 113
—— —— —— China, Manchuria, Eastern.................. 113
—— —— —— China, Pei Ho River 681
—— —— —— China, Shantung, Anz's Route 57
—— —— —— China, Shasi, Port of 681
—— —— —— China, Woosung River 113
—— —— —— China, Wuhu City 681
—— —— —— China, Yangtse River 113
—— —— —— Corea, Telegraph. 682
—— —— —— East Indies, Dutch, Atjeh, &c..................... 241
—— —— —— East Indies, Dutch, Bali 682
—— —— —— East Indies, Dutch, Java en Madoera............. 241
—— —— —— East Indies, Stieler's 114
—— —— —— East Indies, Timor 427
—— —— —— India and Adjacent Countries 161
—— —— —— India, Ceylon, 1904 57
—— —— —— India, Ceylon, 1905 746
—— —— —— Himalayas, Western 241
—— —— —— Japan, Topographic 302
—— —— —— -Minor and Caucasia, Schrader's............... 242
—— —— —— -Minor, Kiepert's, 57, 682
—— —— —— Philippines 618
—— —— —— " Luzon 567
—— —— —— Siberia, Tobolsk, Northern 113
—— —— —— Tian-Shan, Merzbacher Expedition.............. 176
—— —— —— Tibet, Brit. Expedition 427
—— —— —— Tibet Frontier Commission 682
—— —— —— Tibet Geologic... 618
—— —— —— " Lhasa, Plan, Hartleben's 113
—— —— —— Tibet, Lhasa, Plan, Ryder & Cowie's............ 682
—— —— —— Tibet, Royal Geog. Society's 302

PAGE

Maps *noticed,* Asia: Turkestan, Chinese, Stein's 618, 619
—— —— —— Turkestan, Russian 681

—— —— Australasia:
—— —— —— Australia, Sydney, Vicinity of.................... 176
—— —— —— Australia, West.. 683
—— —— —— Australia, West, Geologic, key.................. 746
—— —— —— German Possessions in the Pacific........... 57
—— —— —— Tasmania 683

—— —— Europe:
—— —— —— Austria, Brioni Islands 500
—— —— —— Austria, Cattaro. 113
—— —— —— " Lower, School 746
—— —— —— Austria-Hungary, Railroad and Postal........... 174
—— —— —— Belgium, Transportation 174
—— —— —— Central, Cycling and Automobile................ 746
—— —— —— Central, Springtime in 500
—— —— —— Cyprus, Geologic. 174
—— —— —— Denmark, Baltic Fisheries 55
—— —— —— England and Wales, Bartholomew's.......... 56
—— —— —— England, Aldershot District.................. 303
—— —— —— England, Liverpool Bay..................... 567
—— —— —— England, Mersey River 567
—— —— —— England, Salisbury Plain Dist.................... 747
—— —— —— France, Indre-et-Loire 114
—— —— —— Geologic, International 684
—— —— —— German Empire, Stieler's 242
—— —— —— Germany, Dithmarschen 500
—— —— —— Germany, Holstein, Eastern.................. 56
—— —— —— Germany, Parts of, Botanical................ 684
—— —— —— Germany, Parts of, Rainfall.................. 684
—— —— —— Germany, Saxony, Langhans' 619
—— —— —— Iberian Peninsula. 567
—— —— —— Iceland, Geologic.. 427
—— —— —— " (Survey) 501
—— —— —— Ireland, Bartholomew's 175

Maps *noticed,* Europe: Montenegro, Hassert's 684
—— —— —— North Sea, Temperature 56
—— —— —— Norway, Nissen's Tourist 747
—— —— —— Norway, Official Survey 619
—— —— —— Population 56
—— —— —— Railway and Steamship, Bartholomew's...... 302
—— —— —— Scotland, Botanical (Fife Sheet).............. 114
—— —— —— Scotland, Lochs, Bathymetric 747
—— —— —— Stieler's 114
—— —— —— Sweden, Baltic Fisheries 56
—— —— —— Sweden, Siljan Lake, Bathymetric............. 427
—— —— —— Sweden, Transportation 175
—— —— —— Switzerland, Kümmerly's 567
—— —— —— Switzerland, Topographic 684-685
—— —— —— Turkey, Albania, Geologic 747
—— —— —— Turkey, European, Rumanian areas............... 619

—— —— Ocean:
—— —— —— Atlantic, Pilot Charts, U. S...............621, 744
—— —— —— Atlantic, "Princesse Alice" route.............. 58
—— —— —— South, Bathymetric 620
—— —— —— Atlantic, south, Deep Sea Deposits..............620
—— —— —— Stieler's 621
—— —— —— Pacific, Guam... 241
—— —— —— " North, Drift of S. S. Carlisle................ 567
—— —— —— Pacific, North, Pilot Charts, U. S., 568, 621, 680, 744

—— —— Polar:
—— —— —— Antarctic, Charcot's route and surveys........ 747
—— —— —— Antarctic, Scotia, Track of the.................. 114
—— —— —— Antarctic, Weddell Sea........................ 620
—— —— —— North Polar Chart, Stieler's 242
—— —— —— South Polar Chart, Am. Geog. Soc. 686
—— —— —— South Polar Chart, Stieler's 242

—— —— World:
—— —— —— 1903-04, *Année Cartographique* 58

PAGE

Maps *noticed,* WORLD: Cotton Belt. 58
—— —— —— *Geographen - Kalender* Supplement............. 501
—— —— —— Peip's Taschen Atlas 303
—— —— —— Rubber districts.. 428
Marcillac, North Pole by balloon. 675
Marco Polo, Marsden's, revised by T. Wright *noticed*............ 256
Marès, Roland de. The Congo *noticed* 127
Margoliouth, D. S. Mohammed and the Rise of Islam *noticed.* 760
Marine Fossils near the Southern Edge of the Sahara............ 21
Markham, Sir Clements, Retirement of 563
Markovsina, Cave discovered at.. 420
Ma-Rotse, Pionniers parmi les. Par A. Jalla *noticed*........... 192
Marsden's Marco Polo, revised by T. Wright *noticed*............ 256
Marshall, P. Geography of New Zealand *noticed*............... 701
Martel, E. A. on cave exploration. 671
Martinez, A. B. Baedeker de la República Argentina *noticed*... 759
Maryland, Descriptions of........ 42
—— Geological Survey 553
Masai Reservations.............. 490
Mate, Yerba.................... 413
Mecca, With the Pilgrims to. By Hadji Khan and W. Sparroy *noticed* 317
Mediterranean Traveller. By D. E. Lorenz *noticed*............. 254
Melville-Bryant Drift Casks...... 738
Merrill, Geo. P., President Geol. Soc. of Washington........... 172
Meru, Uhlig's ascent of........ 551
Merzbacher, Gottfried. Forschungsreise in den zentralen Tian-Schan *noticed* 635
Meteorology, Antarctic........105, 613
—— —— Antarctic Stations, 166, 290, 613-614
—— Atmosphere, Balloon Study of 562
—— Chile 606
—— Cuba, Boletín of........... 102
—— Evaporation in the U. S.... 286
—— Great Lakes, 1904.......... 289
—— India 609
—— Instruction in, in the U. S... 558
—— Mexico 605
—— Nansen Expedition, Scientific Results. Vol. VI *noticed*...... 629
Mexico . . . by B. Mallen *noticed.* 312
—— Free Zone................. 288
—— —— —— abolished 670
—— Meteorology 605

PAGE

Mexico. Mexique, Le, au Début du XX^e Siècle. Le Prince R. Bonaparte (et al.) *noticed*.......... 502
—— R. T. Hill and E. O. Hovey in 157
—— Sierra Madre............... 45
—— Sierra Madre of Chihuahua. By E. O. Hovev 531
Meyers Hand-Atlas *noticed*...... 620
Michigan Pine Lands, Retimbering of 101
Milk River (Montana), reclamation project.................. 10
Mill, H. R. Supplement to "Hints to Teachers"................ 616
Mineral products, British Columbia, 1904..................... 669
—— production, Canada, 1904.... 297
—— Statistics, United States, 1904 605
—— Wealth, Alaska. Investigation of. By Alfred H. Brooks.. 26
—— —— Indiana 604
Minnesota, Geographical Society of 222
Minocchi, Salvatore. Per la Manciuria à Pechino *noticed*...... 256
Mission unter Heiden und Mohammedanern, Die ärtzliche. Von H. Feldmann *noticed*..... 763
Missions, Blue Book of 1905, H. O. Dwight *noticed*............ 320
Mohammed and the Rise of Islam. By D. S. Margoliouth *noticed.* 760
Molyneux, A. J. C., on the Victoria Falls 213
Monaco, Oceanographical Museum, *Bulletin of*.................... 52
Montana reclamation projects.... 10
Mont Blanc, Fortnight on........ 610
Montenegro, Dalmatien und. Von L. Passarge *noticed*........... 441
Montgelas, Pauline Gräfin. Ostasiatische Skizzen *noticed*...... 446
Morice, A. G., surveys the Netchakhoh river 102
Morning sold.................. 166
Mornington, a little-known island, visited 492
Morocco Segonzac Expedition.... 667
—— Trois Mois de Campagne au Maroc. Par F. Weisgerber *noticed* 693
—— Truth about. By M. Aflalo *noticed* 309
Mountaineering, Alaska.......... 468
—— Workman on 671
Mountain Elevations, Uniformity in. By Angelo Heilprin....... 726
—— Torrents. Grundriss der Wildbachverbauung *noticed*.... 304
Mountains, Tian Shan. By E. Huntington 513

PAGE

Mount Whitney, Height of...... 734
Muir, L. S., in Iceland........... 163
Muller, Frederick, & Co. Catalogue 425
Munzinger, Carl. Japan und die Japaner *noticed*................ 506
Murman Coast Biological Station. 50
Murray, Sir John. Floor of the North Atlantic................ 18
—— —— —— Honours for...... 172
—— —— —— on Oceanography. 164
Nansen Expedition, Scientific Results. Vol. VI *noticed*........ 629
—— F., on Causes of Ocean Currents 676
Nares Deep, N. Atlantic......... 19
National Road, Building of...... 333
Naturschilderung, Ueber. F. Ratzel *noticed*.................... 58
Navosaigame, conglomerate....... 539
Nebraska, North Platte River reclamation 7
Negritos of Zambales 227
Neptune, Hudson Bay Expedition. 408
Netchakhoh, B. C. Father Morice's explorations 102
Neumayer, G. von, his *Anleitung.* 677
[New Caledonia] Richesses Minérales, &c., M. E. Glasser *noticed* 253
Newfoundland. Humber River.... 661
—— Railway in. By C. M. Skinner 658
—— Terre-Neuve, Saint-Pierre et le French Shore. Par R. de Caix *noticed*................... 191
New Guinea, Exploration in..... 293
—— Mexico, Reclamation projects 6, 11
—— South Wales, Swamps, Drainage of 420
—— Year Island Observatory.... 284
—— York City, Channels surrounding 735
—— —— —— Schools, Geography in 742
New York, Greater. Rock Floor of. By W. H. Hobbs *noticed* 765
—— —— Harbour Entrance Bar, rate of increase............... 72
—— —— —— —— Charts ...69, 72
—— —— —— —— compared with Greytown Harbour....... 76
—— —— —— —— Gedney's Channel 65
—— —— —— —— Land Titles affected by tides............76-77
—— —— —— —— Marine Cross-Sections. *Table* 71
—— —— —— —— Menace to. By L. M. Haupt.............. 65
—— —— —— —— Sandy Hook. 68
—— —— —— —— Sandy Hook, Growth of 73-75

PAGE

New York Harbour Improvement. 604
—— —— State, Central, Devonian plateau.................. 197
—— —— —— —— Finger Lakes 101, 195
—— —— —— —— Gorges and Waterfalls of. By R. S. Tarr. 193
—— —— —— —— Gorges, Buried, etc. 201, 207
—— —— —— —— Hanging Valleys 199
—— —— —— —— Physiographic History 198
—— —— State, Genesee Road.. 326
—— —— —— Mining and quarry industry 604
—— —— —— Road Red Book, 1905 *noticed*................. 668
New Zealand, Geography of. By P. Marshall *noticed*........... 701
—— —— Islands south of, and their flora.................... 422
Nichols, Francis H. Diary of the late, in China................ 339
—— —— —— Obituary 64
Nigeria, Northern, Fulani Rulers. 48
Niger River, Decline of......... 491
Nii Shima, New Pacific Island.... 492
Nile and Euphrates. By H. V. Geere *noticed*................. 189
—— Basin Rains, 1904.......... 601
—— in 1904. Sir W. Willcocks *noticed* 313
—— Upper, Basin of. By Sir W. Garstin *noticed*................ 313
Nordenskjöld, Erland. Work in Northern Bolivia 736
North Dakota reclamation projects 7
—— Platte River reclamation (Neb.—Wyo.) 7
—— Sea, Atlantic water in...... 104
Norway, Fiords, Depths of....... 104
Norwegian Ramble. [By J. Bishop Putnam] *noticed* 439
Nova Scotia, Currents........... 419
Obituary. Bastian, Adolf 298
—— Blanford, Wm. Thomas ... 689
—— Charron, Paul 743
—— Chilovi, Desiderio 497
—— Gauthiot, Charles 238
—— Hall, Elial F. 688
—— Kund, Richard 54
—— Nichols, Francis H. 64
—— Ommanney, Sir Erasmus.... 110
—— Packard, A. S. 172
—— Reclus, Elisée 496
—— Richthofen, F. von......... 689
—— Savorgnan de Brazza...... 640
—— Stanford, Edward 54
—— Stübel, A. M. 110
—— Tomek, W. W. Ritter von.. 497
—— Wiggins, Joseph 690
—— Wissmann, Hermann von... 690

PAGE
Obituary. Ziegler, William...... 497
Ocampo, Mining camp, Chihuahua. 541
Ocean Currents, Causes of...... 676
—— Mineral matter in.......... 237
Oceanographical Museum, Monaco *Bulletin of* 52
Oceanography and other Sciences. 164
—— Pacific Eastern 165
Oklahoma, Reclamation surveys.. 12
Olufsen, O. Dialect of Bokhara.. 229
—— —— Through the Unknown Pamirs *noticed*................ 256
Olympic Peninsula, U. S. 557
Ommanney, Sir Erasmus. Obituary 110
Oppel, A. Die Baumwolle . . . *noticed* 508
Ordnance Survey, British 612
Oregon reclamation projects...... 7
Orkneys, South, and Falkland Islands, Channel between 96
Orléans, Duc d'. Arctic Expedition 294, 493, 672
Ostriches, Cape Colony.......... 665
Other Side of the Lantern, The. By Sir F. Treves *noticed*...... 701
Oxford, Geography in, 1904.... 297
Pacific, Eastern, *Albatross* in the. 165
—— Iron Island in the.......... 737
—— New Island in 492
—— North, Magnetic Survey.... 675
—— ports 580
Packard, Alpheus S. Obituary... 172
Pamirs, Unknown. By O. Olufsen *noticed*.................... 256
Panama Canal, Problems of. By H. L. Abbot *noticed*............ 441
Paraguay, Abhandlungen aus. Von H. Mangels *noticed*............ 447
Paris and Environs. Baedeker *noticed* 308
Pariset, E. Summary of Antarctic Exploration 105
Parry Archipelago, Explorations west of 675
Parsons, Wm. Barclay. Remarks at the A. G. S. Semi-Centennial 25
Partsch, Josef, Prof. of Geography, Univ. of Leipzig.............. 172
Passarge, L. Dalmatien und Montenegro *noticed*................ 441
—— Siegfried 614
Patagonian Lakes 284
Pathfinders of the West. By A. C. Laut *noticed*................. 253
Paul, Carl. Abessinien und die Evangelische Kirche *noticed*.... 311
—— —— Mission . .Deutsch-Südwestafrika *noticed*............. 192
Paulhiac, Lieut. Promenades Lointaines *noticed*................. 763

PAGE
Payette-Boise (Idaho), Reclamation project 9
Peary Arctic Club Expedition, 1905 594
—— R. E. Annual Address: Geographical Work of the World in 1904 129
—— —— Departure from New York 481
—— —— Departure from North Sydney 594
—— —— Expedition, Preparations for 171
—— —— Remarks at the A. G. S. Semi-Centennial 23
—— —— Ship "Roosevelt" launched 220
Pecos River (New Mexico) reclamation project................ 12
Peip, Chr., Taschen-Atlas *noticed*. 303
Pelée, Tower of. By A. Heilprin *noticed* 504
Penck, Albrecht. Lectures in America 53
—— —— on a glacial feature of the Alps 232
Pennsylvania, Topographic Districts, Three.................. 146
—— Topography and Travel in. By W. S. Tower 145
Perl, Albert. Durch die Urwälder Südamerikas 123
Persian Gulf and the South Sea Isles. By E. C. Boehm *noticed*. 122
Peru, Guerras Civiles del. Por P. Gutierrez de Santa Clara *noticed* 436, 692
—— Misiones . . . en el País de los Maynas. Por F. de Figueroa *noticed* 443
Peters, Carl. England und die Engländer *noticed*............. 125
Petroleum, Alaska.............37, 417
Philadelphia, Geographical Society of 286
—— —— —— Bulletin 740
Philippine Census. By Henry Gannett 257
—— —— Spanish 260
—— Islands, The. By F. W. Atkinson *noticed*................. 757
—— Types, Album of.......... 293
Philippines. Agriculture and farms. 268
—— Bontoc Igorot. By A. E. Jenks *noticed* 575
—— Education 266
—— Geographical Names........ 608
—— Inhabitants 258
—— Live Stock in the.......... 228
—— Manufacturing 269
—— Number and area.......... 257
—— Pauperism unknown 267
—— Population 260-265

PAGE

Philippines. Seasons 258
—— Tribes, Location of........ 262
Phillips, E. C. (Mrs. H. B. Looker). Russia *noticed*........... 311
Photograph of Mount Everest.... 480
Photographing wild animals.... 588
Phosphate deposits, North Atlantic. 29
Physiographic Terms, New...... 169
Physiography by Huxley. Revised R. A. Gregory *noticed*.. 61
Picardie, La, et les Régions voisines. Par A. Demangeon *noticed* 447
Pinchot, Gifford. Primer of Forestry *noticed*...............418, 699
Pine Lands, Michigan, Retimbering of 101
Pittsburg in early days.......... 331
Pohle, Ludwig. Entwicklung des deutschen Wirtschaftslebens . . . *noticed* 126
Polar Chart, South. Am. Geog. Soc. 686
Polar Enterprise, International... 674
Pole, North Magnetic, Amundsen Expedition 51, 561
Poles, Temperature at the........ 105
Polyandry, Tibet..............710-713
Population, Italy 161
—— Sweden, affected by geology. 421
—— Titicaca region............. 458
—— United States. Sex proportion 45
Pratt, A. E. Exploration in New Guinea 293
Projection, Van der Grinten's Circular. By G. W. Littlehales.. 14
Provence, Old. By T. A. Cook *noticed* 761
Puini, Carlo. Il Tibet . . . Viaggio de Desideri *noticed*............ 438
Pullen-Burry, B. Ethiopia in Exile *noticed* 702
Pumpelly, Raphael 751
—— —— President Geol. Soc. of America 172
—— Raphael W................ 752
[Putnam, J. Bishop] Norwegian Ramble *noticed*............... 439
Puy-de-Dôme, Rainfall........... 232
Queensland, Coffee 295
—— Henequen in 296
Quelpart, Island of. By H. B. Hulbert 396
Quevedo, S. A. Lafone. Ulrich Schmidel, Viaje . . . *noticed* 185
Quito and Guayaquil Railroad.... 736
Quixote, Don, Centenary of...... 496
Ragozin, Zénaïde. Vedic India *noticed* 319
Railroad, Argentina-Chile......... 607
—— Around the Congo Cataracts. 294
—— Bagdad 229
—— Cape to Cairo............. 294
—— Guayaquil and Quito...... 736
Railroad, Newfoundland. By C. M. Skinner 658
—— Orenburg to Tashkent...... 294
—— Stanley Falls—Great Lakes.. 158
Railroads, Africa 416
—— —— Chemins de Fer Coloniaux en Afrique, E. de Renty. 3e Partie *noticed*..........511, 758
——Bolivia 607
—— China, Central.............. 560
—— Sierra Nevada. Snow obstruction 43
—— United States, 1904......... 668
Rainfall, Ben Nevis..........232, 672
—— Chile, 1903................. 289
—— England, and the wheat crop 231
—— Karst region 162
—— Nile Basin, 1904........... 601
—— Records, Value of.......... 50
—— Thames flow in relation to. 611
—— United States, Arid Region of 556
Ramie, Southern United States.. 295
Rathgen, Karl. Japaner und ihre wirtschaftliche Entwickelung *noticed* 506
Ratzel, Friedrich. Ueber Naturschilderung *noticed*............ 58
Rawling in Western Tibet..103, 160
Reclamation Service. The U. S. By C. J. Blanchard............ 1
Reclus, Elisée. Obituary......... 496
Record, Geographical..40, 97, 157, 222, 286, 416, 490, 551, 601, 665, 732
Red Sea, New port on the....107, 159
Reed, Wm. A., on the Negritos of Zambales 227
Regel, F., und Kirchhoff, A. Literatur zur d. Landeskunde. Vol. II *noticed* 448
Regell, P. Das Riesen- und Isergebirge *noticed*............... 765
Rein, J. J. Japan; Band I *noticed*..695
Reintgen, Peter. Die Kautschukpflanzen *noticed*............... 424
Reitemeyer, Else. Beschreibung Ägyptens im Mittelalter . . . . *noticed* 178
Renouard, G. L'Ouest Africain et les Missions Catholiques *noticed*. 197
Renty, E. de. Chemins de Fer coloniaux en Afrique *noticed*..511, 758
Rhodesia, Ruins in 292
—— Southern, Tobacco in...... 295
Rhys-Davids, T. W. Buddhist India *noticed*................. 320
Ribbe, Carl. Zwei Jahre . . . Salomo-Inseln 307
Richthofen, F. von. Memorial Meeting in honour of.......... 743
—— —— Obituary.............. 689
Riesen- und Isergebirge, Das. Von P. Regell *noticed*.............. 765

PAGE

Rio de Mayo cañon, Chihuahua.. 539
—— Grande, New Mexico. Reclamation project ... 11
River Capture, Biological Evidence of. By D. W. Johnson. *Abstract* 154
Rixon, T. F. Olympic Peninsula. 557
Road Red Book of N. Y. State, 1905 ... 668
Roads across the Appalachians. By A. P. Brigham ... 321
Rocky Mountains, Canadian. Heights in ... 102
Rogers, A. W. Introduction to the Geology of Cape Colony *noticed* 753
Rohrbach, Paul. Vom Kaukasus zum Mittelmeer *noticed* ... 62
Roosevelt, Launching the ... 220
—— leaves New York ... 481
—— leaves North Sydney ... 594
Rotch, A. L. ... 562
Roth, W. E., visits Mornington Island ... 492
Rowland, Percy F. The New Nation *noticed* ... 180
Royal Geographical Society, Awards, 1905 ... 297
—— —— —— Sir Geo. D. T. Goldie elected President ... 563
Royd, Chas. Antarctic observations ... 105
Rubber, Cultivated. By J. C. Horter ... 720
—— in the Amazon Basin ... 143
—— Para. By W. H. Johnson *noticed* ... 255
—— —— in Asia ... 671
—— planting on the Congo ... 159
—— Plants, Study of ... 424
Ruins, Rhodesia ... 292
Rukwa, Lake, Shrinking of ... 225
Rumanian Black Sea Port ... 164
Russia . . . By E. C. Phillips *noticed* ... 311
—— Commercial, 1904 ... 51
—— Orenburg to Tashkent Railroad ... 294
Russo-Chinese Empire. By A. Ular *noticed* ... 179
Ryder in Western Tibet ... 103
Sabinal Mountains, Chihuahua ... 533
Sacramento Valley (Cal.) reclamation work ... 9
Sahara, Floods in ... 46
—— Foureau's map of ... 47
—— Marine Fossils in the ... 21
—— Telegraph ... 666
Saint Bernard, Across the Great. By A. R. Sennett *noticed* ... 384
—— Lawrence, The. By S. E. Dawson *noticed* ... 632
Sakhalin, Partition of ... 724
Salt in Africa ... 290

PAGE

Salt River, Arizona. Reclamation work ... 4
Samassa, Paul. Das Neue Südafrika *noticed* ... 756
Samoa, American. By F. T. Chambers ... 641
—— Land laws ... 645
—— Native labour ... 645
—— People of ... 646
—— Tutuila, Matafau, highest mountain ... 644
Sandberg, Graham. Exploration of Tibet *noticed* ... 444
San Miguel River, Chihuahua ... 532
Saskatchewan, New Canadian Province ... 419, 668
Savorgnan de Brazza. Obituary. 640
Sawtell, Arthur. Actual India *noticed* ... 306
Schiff, Jacob. Gift to Harvard University ... 563
Schillings, C. G. Mit Blitzlicht und Büchse *noticed* ... 588
Schleswig - Holstein, Naturwiss. Verein für., 50th Anniversary. 298
Schmidel, Ulrich. Viaje . . . [Spanish Translation.] S. A. Lafone Quevedo *noticed* ... 185
Schrader, F. Atlas Universel, Parts *noticed* ... 242, 747
Schultz-Lorentzen on Eskimo immigration ... 673
Scientific Literature, International Catalogue of *noticed* ... 316
Scotia Bay, South Orkneys, Meteorological Station..166, 290, 613-614
Scotia, Meteorological record ... 96
—— Second Antarctic Voyage ... 94
Scott, J. E. In Famine Land *noticed* ... 383
Scott, R. F. ... 678
Scott, W. B., Kane Medal awarded to ... 424
Seal Fishery, 1904 ... 107
Seaweed Industries of Japan ... 736
Segonzac Expedition, Morocco ... 667
—— Marquis de, in captivity ... 291
Seismology, Libbey Circle in ... 677
Semi-Centennial of the American Geographical Society ... 22
Sennett, A. R Across the Great Saint Bernard *noticed* ... 384
Seward Penin. (Alaska), Gold output ... 33
Shor Kul, Salt Lake, Tian Shan. 523
—— —— Swamp springs ... 524
Shoshone (Wyoming), Reclamation project ... 13
Siam, Cadastral Survey of ... 161
Siboga, Een Jaar Aan Boord. Door A. Weber van Bosse *noticed* ... 180

PAGE

Sieberg, August. Handbuch der Erdbebenkunde *noticed* 305
Sieger, Robert 678
Sierra Madre, Chihuahua, Drainage 532
—— —— Mexico 45
—— —— Western, of Chihuahua, Mexico. By E. O. Hovey...... 531
—— Nevada, Snow and railroads in 43
Sievers, Wilhelm. Südamerika und die deutschen Interessen *noticed* 177
Simler, Josias, et les Origines de l'Alpinisme. Par W. A. B. Coolidge *noticed* 568
Simplon Tunnel 230
Simpson, W. J. Maintenance of Health in the Tropics *noticed*. 571
Sipibo, Diccionario, K. von den Steinen *noticed* 503
Sirt, grassy plains, Tian Shan.... 514
Sistan *Baluchi*, nomads.......... 277
—— Birds of 276
—— Eastern Persia, Depression of. By E. Huntington 271
—— Irrigation 275
—— Lake and Swamp 276
—— *Sayads* or Fowlers 277
—— *Sistani*, tiller of the soil... 277
—— Wind, effect of 278
Sitka (Alaska), Gold quartz found 1879 30
Skinner, Charles M. The Railway in Newfoundland 658
Smith, J. Russell. Economic Importance of the Plateaux in Tropic America 461
—— —— Organization of Ocean Commerce *noticed* 574
Snake River, Idaho. Reclamation project 6
Soils, Bureau of, U. S. Field Work, 1903 559
Solomon Islands. Zwei Jahre, &c. Salomo-Inseln. Von C. Ribbe *noticed* 307
South Dakota reclamation projects. 8
—— Polar chart published by the Am. Geog. Soc. 686
South Polar Times 235
Sparroy, Wilfred, and Hadji Khan. With the Pilgrims to Mecca *noticed* 317
Speleology, Recent exploration.... 671
Spencer, J. W., on Submarine Cañon of Hudson River...... 100
Spitzberg, Une Croisière au. Par Jules Leclercq *noticed* 181
Stanford, Edward. Obituary..... 54
Stanley Falls-Great Lakes Railroad. 158
Stanley, Le Roi des Explorateurs, par J. Joûbert *noticed* 572
Statistisches Taschenbuch A. Hartleben *noticed* 313
Stedman, E. C. and T. L. Complete Pocket Guide to Europe *noticed* 442
Steindorff, Georg. Durch die Libysche Wüste zur Amonsoase *noticed* 317
Steinen, Karl von den. Diccionario Sipibo *noticed* 503
Stejneger, Leonhard. Geographical Distribution of Discoglossoid Toads 91
Stengel, Karl Freih. v. Der Kongostaat *noticed* 192
Stevenson, E. L. Map Studies in Europe 742
Stieler's Atlas, Parts *noticed*, 114, 242, 303, 428, 621, 685
Stikine River, Alaska. Gold found 1865 28
Stone, Andrew J. Explorations, Arctic America *noticed* 502
Strakosch, Siegfried. Amerikanische Landwirtschaft *noticed* ... 759
Stream measurements, 1903...... 419
Stromboli, Anderson's Expeditions to 162
Stübel, A. M., Obituary 110
Students of the Université de Paris, Travels of 297
Sudan Almanac, 1905 552
—— Anglo-Egyptian 45
—— Cotton-growing in 225
Suezkanal, Der. Von A. Ungard *noticed* 511
Summit levels, Alpine 423
Sun, Eclipse, U. S. Expedition.. 562
—— River (Montana), Reclamation project 11
Survey, Alaska Boundary 733
—— British Ordnance 612
—— Cadastral, of Siam 161
—— Magnetic, North Pacific.... 675
—— U. S. Coast and Geodetic, Terrestrial Magnetic Work of. By G. W. Littlehales 281
—— U. S. Geological, Publications *noticed*..240, 287, 417, 419, 548-550, 554, 557, 677, 765
Surveying, American Manual of Instruments used 762
Surveys, River, 1903........... 550
—— South Africa 416
—— Uganda 601
Susquehanna Drainage Basin 550
Svenska Turistföreningens Arsskrift, 1904 *noticed* 251
Sverdrup, Otto 424

PAGE

Sweden, Commerce, 1903 163
—— Population affected by geology 421
Switzerland, Die Aenderung des Projektions-systems, &c. *noticed*. 440
—— Industries 561
Sykes, Mark. Dar-Ul-Islam *noticed* 639
Tarim River, Lower. Lakes beside. By Sven Hedin 78
—— —— —— Lakes fed by 82
—— —— —— Lakes, Dunes near 83
Tarr, Ralph S. Gorges and Waterfalls of Central New York 193
Telegraph, Congo 666
—— Sahara 666
Telegraphy, Wireless, in the Andamans 230
—— —— Naval Service 43
Temperature at the Poles 105
—— Ben Nevis 611
—— Subterranean 236
—— Zones after Supan 388
—— —— Köppen's Classification. 392
Temperatures, Antarctic 167
—— Sensible, on the Congo 291
Terrainlehre des Kartenlesens und Croquierens, Elemente der *noticed* 181
Terra Nova sold 166
Terrestrial Magnetic Work of the U. S. Coast Survey. By G. W. Littlehales 281
—— Magnetism in Louisiana 734
Thames, Flow of, and Rainfall .. 611
Thomas, Owen. Agricultural, &c., Prospects of S. Africa *noticed*. 308
Thuringia-Saxony geographical Union, Mitteilungen 672
Thwaites, R. G. *Reprint* Lahontan's N. America *noticed* 576
Tian Shan, Central. Forschungsreise von M. Friederichsen *noticed* 60
—— —— —— Forschungsreise von G. Merzbacher *noticed* 635
—— —— Glacial Period in 521
—— —— Glaciers and glaciation. 518
—— —— Kirghiz, Dress of 516
—— —— Kirghiz migrations 515
—— —— Kirghiz pasture ground 518
—— —— Lakes 518, 523-530
—— —— Mountains and Kibitkas of. By E. Huntington 513
—— —— Shor Kul, Salt Lake .. 523
—— —— Sirt, grassy plains 514
Tibet, Aksaï Chin or White Desert 710
—— Climate 229
—— Early travels to 713
—— Exploration of. By G. Sandberg *noticed* 444

PAGE

Tibet, From Tiflis to. By O. T. Crosby 703
—— Il Viaggio . . Desideri, von C. Puini *noticed* 438
—— Karakash River, Source of .. 710
—— Opening of. By P. Landon *noticed* 184
—— Polyandry 710-713
—— Western, Ryder and Rawling in 103, 160
Tiflis to Tibet. By O. T. Crosby. 703
Titicaca, Island of 453, 458
—— Lake, Basin of. By A. F. Bandelier 449
—— —— —— —— Alimentary Plants 456
—— —— —— —— Animals 458
—— —— —— —— Birds 456
—— —— —— —— Minerals ... 455
—— —— —— —— Population .. 458
—— —— —— —— Vegetation .. 455
Titicaca, Lake, Climate 453
—— —— Depth and length 452
—— —— Thunderstorms 453
—— —— Water temperature 452
—— Titi Kala, or stone of the cat 457
Toads, Discoglossoid, Geographical Distribution of. By L. Stejneger 91
Tobacco, Southern Rhodesia 295
Toll, Baron, Fate of 234
Tomek, W. W. Ritter von. Obituary 497
Topographic Forms, Youth, Maturity and Old Age of. By D. W. Johnson 648
Topography and Travel in Pennsylvania. By W. S. Tower ... 145
—— Influence of caverns upon .. 107
Tornado, Vavau Islands 422
Tortugas, Marine Biological Laboratory at 158
Tower, Walter S. Geography of American Cities 577
—— —— Topography and Travel in Pennsylvania 145
Tozier, Josephine, Traveler's Handbook *noticed* 572
Trafton, · H. Laboratory and Field Exercises in Physical Geography *noticed* 760
Transactions of the Society, 40, 97, 157, 222, 286
Transvaal, Glaciation in 416
Treves, Sir Fredk. The Other Side of the Lantern *noticed* 701
Tropics, Far Eastern. By A. Ireland *noticed* 439
—— Maintenance of Health in the. By W. J. Simpson *noticed*. 571

PAGE

Tunisie et Algérie, Le Peuplement Italien en. Par G. Loth *noticed* ... 384
Turkestan, Climate ... 608
—— Explorations in. Carnegie Institution Publication *noticed.* 751
—— Issik Kul Lake ... 527
[Turkey] Konstantinopel, &c. Baedeker *noticed* ... 753
—— Türkei, Rumänien, Serbien, Bulgarien. *Guide noticed* ... 572
Uganda Protectorate and White Settlement ... 225
—— Surveys in ... 601
Uhlig, H., African Mountain Ascents ... 551
Ular, Alexandre. Russo-Chinese Empire *noticed* ... 179
Uncompahgre Valley reclamation (Colorado) ... 6
Ungard, Albert. Der Suezkanal *noticed* ... 511
Uniformity in Mountain Elevations. By A. Heilprin ... 726
United States. Amerikanische Landwirtschaft von S. Strakosch *noticed* ... 759
—— —— Arid Region, Rainfall variation ... 556
—— —— Board on Geographic Names ... 108, 298, 670, 742
—— —— Bureau of Soils, Field Work, 1903 ... 559
—— —— Coast and Geodetic Survey, Annual Report, 1904 ... 559
—— —— Coast and Geodetic Survey, Terrestrial Magnetic Work of. By G. W. Littlehales. 281
—— —— Evaporation in the ... 286
—— —— Fish Commission Transplanting work ... 563
—— —— Geographical Work in the, 1904 ... 131
—— —— Geologic Atlas *noticed,* 54, 110, 172, 240, 300, 426, 499, 566
—— —— Geological Survey Publications *noticed* ... 240, 287, 417, 419, 548-550, 554, 557, 677, 765
—— —— Inland commercial centres ... 581
—— —— Irrigation in 1902 ... 99
—— —— Map of, on a Scale of 1:1,000,000 ... 730
—— —— Meteorological Instruction in the ... 558
—— —— Mineral Statistics, 1904. 605
—— —— National Herbarium, Contributions. Vol IX *noticed* ... 411
—— —— Population. Sex proportion ... 45
—— —— Railroads, 1904 ... 668
—— —— Reclamation Service. By C. J. Blanchard ... 1

PAGE

United States, Reclamation Service, Funds received ... 2
—— —— —— —— Principal projects ... 3
—— —— Semi-Arid region, Crops in ... 224
—— —— Western Explorers, Early, and the Railroads. By H. Gannett ... 716
Utah, Reclamation surveys ... 12
Valleys, Hanging ... 423
—— —— Central New York ... 199
Van Den Berg, N. P. Uit de Dagen der Compagnie *noticed.* 253
Van der Grinten's Circular Projection. By G. W. Littlehales ... 14
Van Hise, C. R. Metamorphism *noticed* ... 550
Vatna Jökull, Iceland, explored ... 163
Vavau Islands, Tornado in ... 422
Verein für Erdkunde, Halle a. S. ... 672
Verner, Samuel P. Pioneering in Central Africa *noticed* ... 126
Victoria Falls of the Zambesi ... 103, 213
—— Geography of. By J. W. Gregory *noticed* ... 312
—— Nyanza, Oscillations in level of ... 49
Vidal de la Blache honoured ... 425
Vienna, Widening of ... 230
Vivien de Saint-Martin, Atlas Universel, Parts *noticed* ... 242, 747
Wack, H. Wellington. Story of the Congo Free State *noticed* 187
Wagner, Herman. Lehrbuch der Geographie *noticed* ... 182
Wähner, Franz. Sonnenwendgebirge im Unterinnthal *noticed* ... 755
Wallace, Dillon. Lure of the Labrador Wild *noticed* ... 190
Wang, Ferd. Grundriss der Wildbachverbauung *noticed* ... 304
Ward, Robert De C. Climatic zones and their Subdivisions ... 385
Washington, Reclamation surveys. 13
Waters, Underground, Bibliography of ... 419
Weather Bureau Official conventions ... 555
—— Forecasts, Long-range ... 238
Weber van Bosse, A. Een Jaar Aan Boord H. M. Siboga *noticed.* 180
Weddell Sea, Antarctic ... 96
Weeks, F. B., Geologic Bibliography ... 167, 549, 677
Wegener, Georg. Reisen im westindischen Mittelmeer *noticed* ... 637
Weisgerber, F. Trois Mois de Campagne au Maroc *noticed* ... 693
Well drilling, Deep ... 550
Weltwirtschaftliche Neubildungen. Von Paul Dehn *noticed* ... 251

PAGE

West Indian Archipelago, Origin of ... 735
West Indies. Agriculture ... 289
Westindischen Mittelmeer, Reisen im. Von G. Wegener *noticed* .. 637
Wheeler, A. O., measures heights, Canadian Rocky Mountains.... 102
White, A. Silva ... 172
Whitney, Caspar. Jungle Trails and Jungle People *noticed*.... 699
—— Mount, Height of ... 734
Wiborg, Frank. Commercial Traveller in South America *noticed*. 700
Wiggins, Joseph. Obituary ... 090
Wigner, J. H. in Iceland ... 163
Wilderness Road (Boone's Trail). 338
Willcocks, Sir Wm. Nile in 1904 *noticed* ... 313
Willis, Bailey ... 614, 678
—— —— in Eastern China..... 160
Wind Zones ... 393
Winds, Mountain, Kern Co., Cal. 44
Wireless Telegraph in the Andamans ... 230
—— —— Naval ... 43
Wissmann, Hermann von. Obituary ... 690
Witwatersrand gold, Origin of.. 226
Wolkenhauer, August. Fifteenth German Geog. Congress in Danzig ... 653

PAGE

Wollant, Gregoire de. Land of the Rising Sun *noticed* ... 756
Workman, W. H. on high mountaineering ... 671
World, Chinese Map of the.... 171
Wright, Marie Robinson. Republic of Chile *noticed* ... 189
—— Thomas. Marsden's Marco Polo, revised *noticed* ... 256
Wyoming, North Platte River reclamation ... 7
—— Shoshone reclamation project. 13
Yaqui River cañon, Chihuahua... 536
Yellowstone Forest Reserve. Absaroka Div ... 548
—— reclamation projects ... 11
Yerba Mate ... 413
Yukon, Into the. By W. S. Edwards *noticed* ... 308
—— River placer districts.... 31, 35
Zambales, Negritos of ... 227
Zambesi, Victoria Falls of the..103, 213
Zelau, Curt von. Nordafrikanische Touristfahrten *noticed* ... 573
Ziegler Arctic Expedition, 171, 234, 612 ,674
—— William. Obituary ... 497
Zones, Climatic, and their Subdivisions. By R. DeC. Ward.. 385

MAPS AND ILLUSTRATIONS.

MAPS.

PAGE

Alaska, showing mineral deposits. 29
Alaskan Range, *sketch* ... 469
Amazon Basin, Distribution of Hevea in the, *facing* ... 143
Canada's Two New Provinces.. 669
China, Route of Francis H. Nichols 1903-04 ... 356
Japan, Earthquakes in ... 217
(Lakes beside the Lower Tarim) *facing* ... 78
Newfoundland, Railway Across.. 659
New York Harbour Entrance *sketch* ... 66-67
Quelpart Island ... 397

PAGE

Sakhalin *sketch* ... 725
Sistan (Eastern Persia)......272, 280
South Polar Chart *facing* ... 702
Temperature Zones after Köppen *facing* ... 385
Temperature Zones 388, 389, 391
Titicaca, Lago* ... 451
Topographic Forms.....649, 651, 652
Tutuila (Samoa) *facing* ... 641
United States, Areas drawn for Reproduction on the Scale of 1:1,000,000 ... 731
United States Reclamation Projects *facing* ... 1
Victoria Falls, Sketch Plan ... 213

* In this map read the latitudes from top to bottom, 15, 16, 17.

ILLUSTRATIONS.

	PAGE
Alaskan Range, 5 views	470-479
Braddock's Road, Milestone on the line of	324
Cerro Voludo, Chihuahua	540
Cumberland Gap from the East	337
Everest from Khamba Jong	480
Findelen Barley and Rye Fields	421
Gazelles, Dwarf (Flash Light)	591
Giraffe	592
Gorges and Waterfalls, Central New York, Sketch and 9 views,	193-210
Iron Island in the Pacific	737
Kugart Valley Terraces, Cross Section	520
Lancaster Pike, Hambright's Hotel on the	330
National Road, Bridge and Monument	334
National Road, Toll-House on the	328
Newfoundland, Humber River	661
Newfoundland, Valley of the Little Codroy	663
New Year Island Observatory	284
Ocampo, Silver Camp, Chihuahua	542
Rhinoceroses in a Swamp	589
Rio de Mayo Cañon, Chihuahua	541
Roosevelt Afloat, March 23, 1905, *facing*	220
Roosevelt Dam Site, Salt River, Arizona	5
Samoa, Government Station	642
Samoa, High Chief Mauga	643
Samoa, Native Girls with Clubs	646
Shor Kul Swamp, Cross Section	525
Van der Grinten's Circular Projection *figures*	16, 17
Yaqui (Aros) Cañon, Chihuahua,	534, 535
Yaqui (Aros) River	537
Yerba Mate	414
Zebras and Gnus	593